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REA AS A COMPETITIVE FACTOR IN THE ECONOMY OF THE UNITED STATES

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Under the direction of
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Since the beginning of the electric power and light industry in the United States about 1882, considerable attention has been given to the application of electricity to agriculture. However, because of its high ratio of investment to revenue and dependence on the development of generating plants and adequate transmission and distribution facilities, progress in providing electric service for rural areas was relegated to the background until its possibilities could be more profitably exploited by private capital. It was perhaps a natural course from the accepted business point of view for the private industry to concentrate its attention on the more profitable urban areas with their attendant industrial, commercial and residential sources of revenue. The rural market was left comparatively untouched, especially in view of the phenomenal expansion of urban uses of electricity in electric railways, highway and home lighting, industrial power, household appliances and advertising.

It is significant that agricultural use of power attained its earliest and widest application in connection with the development of large-scale irrigation in the western States. This rural electrification began about 1900 in the San Joaquin and Sacramento Valleys of California and was aided by the accessibility of transmission lines carrying hydroelectric power generated in the mountains to the cities on the coast. Irrigation farming afforded a substantial market for electricity and insured the profitableness of these early rural lines.

The extension of lines into rural areas of the more densely populated New England and Middle Atlantic States was likewise not the result of planned general rural electrification, but rather constituted taps from lines linking towns, villages and industrial centers. Specialized farms such as dairy, poultry, fruit and truck gardening, which were usually close to urban areas, accounted for many of these electrified farms. Service was thus available to those who were fortunately situated in the vicinity of feeder lines. This type of extension, although it found its most favorable opportunity in the Atlantic Seaboard States, characterized the development of the so-called "rural electrification" programs the country over.

1/ By H. Brettman, Junior Engineer, under the direction of H. S. Person, Consulting Economist. December, 1939.

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RURAL ELECTRIFICATION ADMINISTRATION AS

A COMPETITIVE FACTOR IN THE ECONOMY OF THE UNITED STATES[1]

I. THE BEGINNINGS OF RURAL ELECTRIFICATION

Since the beginning of the electric power and light industry in the United States about 1882, considerable attention has been given to the application of electricity to agriculture. However, because of the high ratio of investment to revenue and dependence on the development of generating plants and adequate transmission and distribution facilities, progress in providing electric service for rural areas has relegated to the background until the possibilities could be more profitably exploited by private capital. It was perhaps a natural course from the managed business point of view for the private industry to concentrate its attention on the more profitable urban areas with their diversified industrial, commercial and residential sources of revenue. The rural market was left comparatively undeveloped, especially in view of the phenomenal expansion of urban uses of electricity in electric railways, highway and home lighting, industrial power, household appliances and advertising.

It is significant that agricultural use of power antedated the earliest and widest application in connection with the development of large-scale irrigation in the western States. This rural electrification began about 1900 in the San Joaquin and Sacramento Valleys of California and was aided by the accessibility of transmission lines carrying hydroelectric power generated in the mountains to the cities on the coast. Irrigation farming afforded a substantial market for electricity and insured the profitableness of these early rural lines.

The extension of lines into rural areas of the more densely populated New England and Middle Atlantic States was likewise not the result of planned general rural electrification, but rather consisted in a few lines linking towns, villages and industrial centers. Specialized farms such as dairy, poultry, fruit and truck gardening, which were usually close to urban areas, accounted for many of these electrified farms. Service was thus available to those who were fortuitously situated in the vicinity of feeder lines. This type of extension, although it found its most favorable opportunity in the Atlantic Seaboard States, characterized the developments of the so-called "rural electrification" programs the country over.

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[1] By H. Trotter, senior engineer, under the direction of H. S. Person, Consulting Engineer. December, 1939.

For instance, the Alabama Power Company heralds its pioneering of rural electrification in 1923 as having brought service to 8,609 new rural customers by December 1929. Yet on April 1930 the Bureau of the Census reported only 3,839 or 1.5 percent of the occupied farms in Alabama as receiving central station service. The Alabama Power Company "Report to the Stockholders" of at least the years 1932, 1933, 1934, and 1938, contained in the chapter on rural electrification a statement to the effect that the Alabama Power Company's rural system consists of certain line mileage along the highways of the State serving a certain number of rural consumers. Under General Order "U-4" of the Alabama Public Service Commission, "'Rural Extension' shall be taken to mean the provision of all facilities (poles, fixtures, wires, sub-stations and appurtenances) as are necessary for delivering electrical energy for general use outside of urban centers where the consumer density is less than twenty (20) customers per mile of line."[2]

Again, in 1917-18 the Northern Iowa Gas and Electric Company integrated a number of small rural systems, thus permitting the extension of service to several communities previously without it.[3] It should be noted, however, that the consumer density averaged 31.5 to the mile.

The term "rural system", as applied by private utility companies in the years prior to 1923 and to a large extent even before 1935 to extensions serving from five to twenty or even more customers per mile backed by distribution lines of high density, is a misnomer in the light of present day REA construction with an average consumer density of three to the mile or less.

The fact that rural extensions advanced more rapidly in areas of irrigation farming and where feeder or backbone lines linking rural and suburban communities made service accessible to farms along the routes is strikingly illustrated in the figures for electrified farms shown in Table I, Appendix A. Thus irrigation States such as Idaho, Utah, and the Pacific States together with the New England and Middle Atlantic States having a total of 883,643 farms, or about 14 percent of the farms in the United States, in 1920 had 104,934 or 59.1 percent of all farms electrified in 1923. These States, likewise, showed 11.9 percent of their farms electrified, with the Pacific States alone having 21.7 percent of their farms electrified as a contrast to the national average of but 2.8 percent. It is thus evident that programs of rural extension were not comprehensive in form or

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2/ The italics are not in the source documents.
3/ Rural Electrification Administration -- "Electric Power on the Farm", p. 60.

For instance, the Alabama Power Company boasts its pioneering of rural electrification in 1923 as having brought service to 2,500 new rural customers by December 1923. Yet on April 1930 the Bureau of the Census reported only 2,839 or 1.8 percent of the occupied farms in Alabama as receiving central station service. The Alabama Power Company "reports to the Stockholders" at at least the years 1923, 1925, 1934, and 1935, mentioned in the chapter on rural electrification a statement to the effect that the Alabama Power Company's rural system consists of certain line mileage along the highways of the State serving a certain number of rural customers. Under General Order "U-4" of the Alabama Public Service Commission, "Rural Telephone" shall be taken to mean the pressing of all facilities (poles, fixtures, wires, sub-stations and apparatuses) as are necessary for delivering electrical energy for general use outside of urban centers where the consumer density is less than twenty (20) customers per mile of line."[2]

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The term "rural system", as applied by private utility companies in the years prior to 1923 and to a large extent even before 1938 to extensions serving from five to twenty or even more customers per mile based by distribution lines of high density, is a misnomer in the light of present day REA construction with an average consumer density of three to ten mile or less.

The fact that rural extensions advanced more rapidly in areas of irrigation farming and where feeder or backbone lines linking rural and suburban communities made service possible to farms along the routes is startingly illustrated in the figures for electrified farms shown in Table I, Appendix A. Thus irrigation States such as Idaho, Utah, and the Pacific States together with the New England and Middle Atlantic States having a total of 386,844 farms, or about 16 percent of the farms in the United States, in 1920 had 104,924 or 69.1 percent of all farms electrified in 1932. These States, however, showed 11.9 percent of their farms electrified, with the Pacific States alone having 21.7 percent of their farms electrified as a contrast to the national average of only 8.8 percent. It is thus evident that programs of rural extension were not comprehensive in form or

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application, and were not intended for widespread farm electrification.

II. REASONS FOR LAG IN RURAL ELECTRIFICATION

The attitude that there is economic saturation and that the market for rural power is too scattered to be advantageously developed has been a prevalent one among private utilities and has been clearly expressed in the trade journals and in company and public service commission reports. This was perhaps the expression of a business point of view accustomed to the large financial returns and conditioned by the techniques of urban construction and operation applied to extensions. One of the earliest expressions of policy is that, "In 1912 the Middle West Utilities System formulated a 'rural' policy which recognized only that service could be profitably extended to 'compact groups of small towns.' This attitude was about in line with that of the industry as a whole, which was discussing rural industries as possible buyers of current, but did not at that time consider the farm itself as a rural industry."4/

The usual explanation offered for the low percentage of electrified farms in this country is that it is first necessary to construct a system of transmission lines as backbones for rural extension. Even in 1935, H. S. Bennion of the Edison Electric Institute still writes, "It has as yet been uneconomic to extend electric service to the great majority of farms in the United States. This will continue to be the situation for many years to come. The cost of building lines to reach these farms is out of all proportion to the benefits to be derived by the farmer from the use of electricity. Considering the obstacles and the economic problems to be met, companies of America over the past fifteen years have made remarkable progress in carrying electricity to the farm; much more progress than any other country has made."5/

Mr. G. C. Neff, of the Wisconsin Light and Power Company, in discussing the prospects of rural electrification in October 1934 asserted "that it is necessary to build the load so that the present farm lines earn their way before we can expect new money to be forthcoming to build additional lines into new territory."6/ In an address

4/ Electric Power on the Farm, by David C. Coyle, p. 60.
5/ E.E.I. Bulletin, Vol. III, November, 1935, No. 11, p. 410.
6/ E.E.I. Bulletin, Vol. III, January, 1935, No. 1

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[8] N.E.L. Bulletin, Vol. III, November, 1928, No. 11, p. 410.
[9] N.E.L. Bulletin, Vol. III, January, 1929, No. 1

delivered on June 5, 1935, Mr. Hudson W. Reed expressed the opinion that "This clamor (for rural electrification) has not been initiated by the farmer himself. Only in the imagination of these, his champions, does there exist any widespread demand for electric service on the farm, or any general willingness, or ability, to pay for it."7/

These opinions are in general representative of the attitude of the industry and summed up state merely the belief that farm earnings and economic resources are too low to justify service to low density areas with the high costs of rural extensions. These apathetic views are all the more striking in the light of certain studies of the problems of rural electrification that had been made by or with the participation of the private industry, and had recognized that electricity on the farm was not only desirable for its social benefits but also as a possible potential source of revenue. In 1921 the National Electric Light Association established a rural lines committee to study costs and design. This committee collected and tabulated data concerning the practices of many utility companies but did not effectively point the way to newer, better and less expensive lines when measured by the lack of uniform construction and wide range of costs reported by the industry. Also, to study the problem of rural electrification a Committee on the Relation of Electricity to Agriculture was organized which consisted of twelve members, three of whom were officers of the American Farm Bureau Federation, four were representatives of the National Electric Light Association and one each of the American Society of Agricultural Engineers, the manufacturers of farm electric plants, and the United States Departments of Agriculture, Commerce and Interior. This CREA in cooperation with the State agricultural experiment stations accomplished some excellent work in experimentation and compilation of a large number of agricultural applications of electricity. However, no national organization concerned itself very deeply with the questions of rates and extension policies in the light of their effect on rural electrification, or prosecuted an active campaign to solve these problems.

III. RESTRICTIVE RATES AND EXTENSION POLICIES

Some individual companies recognizing local needs and demands, did take cautious steps in the direction of making service generally available to farmers. In New York State the so-called Adirondack Plan was initiated by the Adirondack Power and Light Corporation in 1923 and was generally accepted by other companies. This plan simply established a minimum monthly revenue of $24 per mile to be shared

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7/ E.R.I. Bulletin, Vol. III, June, 1935, No. 6.

equally by the customers. It was considered an improvement over privious requirements for contributions to construction. Many favorably conditioned farmers were able to take service, but in bona fide farm areas with a density of three or four farms to the mile, many found this rate beyond their means even where service was available.

A few companies like the Puget Sound Power and Light Company, Washington Water Power Company, Detroit Edison and Consumers Power Company formulated the policies of making urban rates available to rural consumers but required contributions towards construction. Rate plans prior to 1935, however, were generally restrictive of rural electrification, ranging from requirements that prospective consumers pay the entire initial cost of a service extension with title resting in the power company to partial contributions to construction with high minimum bills or line and capacity charges.

Typical of the rate schedules which placed electric service beyond the means of the farmer in ordinary circumstances is that of the Alabama Power Company, which in brief set forth the following rate effective on July 1, 1927:

5 cents per kwh for the first	50 kwh consumed per month;	plus
3 cents per kwh for the next	950 kwh consumed per month;	plus
2 cents per kwh for all over	1,000 kwh consumed per month.	

The above is net and the gross charge if not paid in full within ten days from date of bill is ½¢ more per kwh.

Rural Line Charge

"In addition to the rate for electric energy actually consumed each Consumer receiving service from a rural line shall pay monthly a 'rural line charge' based upon the number of Consumers per mile and the individual capacity contracted for, as follows:

Monthly Rural Line Charge	Consumers Per Mile: Over 15 Group "A"	Over 10 and Not More Than 15 Group "B"	Over 5 and Not More Than 10 Group "C"	5 or Less Group "D"
For the 1st kw of contracted capacity or fraction thereof	$1.75	$2.25	$3.00	$4.00
For each additional kw of contracted capacity	1.50	1.50	1.50	1.50

Determination of Consumers Per Mile and Consumers Contracted Capacity

"The Consumers per mile shall be the total number of consumers served from the rural line, not including those in urban centers served from such line, divided by the total mileage of distribution pole line serving such Consumers, exclusive of service lines.

"The contracted capacity of each Consumer shall be the sum total of his load requirements determined as hereinafter set out but not less than an amount sufficient to bring the total contracted capacity of all Consumers served by a rural line under this Classification to a minimum of 10 kw per mile of rural line. When urban or industrial load is served from a rural line the Company will credit the rural line with such business and will modify the minimum rural requirements according to Rule 9 under Special Rules Governing the Application of Service Classification 'E'."

It is to be noted that 10 kw of contracted capacity is the controlling factor under this schedule. Thus for 5 consumers to the mile, each would have to pay a $4.00 monthly rural line charge plus $1.50 to meet the contracted capacity requirement or a total line charge of $5.50 per month in addition to energy charges. For three consumers to the mile the line charge would be $4.00 plus the charge for 2-1/3 kw additional contracted capacity of $3.50, making a total of $7.50 per month for line charge alone.

Another typical rate was that of the Consumers Power Company which prior to 1935 called for the construction of farm line extensions provided the customers deposited $1,000 per mile, less $100 for each farm customer connected at the time the line was built. Under this plan, to obtain a mile extension of line four customers were required to deposit $600, three customers to deposit $700 and two customers to deposit $800. In addition, the regular residential rates were applied.

At that, the above extension plan was considered an improvement over that offered by the Utica Gas and Electric Company, one of the first companies to establish extension policies, when in 1915 it required the prospective consumer to pay the entire cost of the line and in addition to guarantee an annual minimum charge of $100.

IV. EFFECTS OF RESTRICTIVE RATES

The effect of such rate structures and extension policies was to intensify the practice of so-called "cream skimming", i.e., routing lines through the more densely populated farm sections with little or no consideration for areal coverage, so that as high density lines were extended the surrounding areas became thinner and thinner and by the same token had receding prospects of obtaining service because pro rata costs necessarily increase as customer density is lowered.

The Public Service Commission of N. Y. called attention to the dangers of cream skimming in its 1930 report:

> "Lines are built where there is the most insistent demand for electricity and where the density of customers makes possible a low monthly minimum bill and few objections to the cost of installation. If the areas having the greatest density of customers are served first, it will be increasingly difficult to make electricity available to those in the more sparsely settled areas. If an entire area could be served as a unit there would be little hardship for anyone."

The results of restrictive rate plans are shown in the lack of progress in rural electrification. The following are the figures for farm electrification in the United States:

Progress of Rural Electrification in the United States

Year ending January 1	No. of electrified farms	Percentage of all farms electrified
1925	204,780	3.2
1926	246,150	3.9
1927	309,125	4.9
1928	393,221	6.2
1929	506,242	8.0
1930	576,169	9.2
1931	649,919	10.2
1932	698,786	10.7
1933	709,449	10.8
1934	713,558	10.5
1935	743,954*	10.9
1936	788,795	11.6
1937	1,042,924	15.4
1938	1,241,505	18.2
1939	1,410,000	20.6
June 1939	1,513,000	22.1

*REA established May 1935.

Source: Number of electrified farms: 1925 to 1930 -- Statistical Bulletin, No. 2, April 1935, Edison Electric Institute. 1931 to 1938 --Electrical World, January 1938. 1939 -- REA estimates.

Thus in the ten years, 1925 through 1934, approximately 510,000 farms received central station service at which rate it would have taken more than 50 years to make electricity available to 50 percent of the farms in the United States. At the end of 1934 only 10.9 percent of all the farms in the country were electrified.

In contrast to the low percentage of farms electrified in the United States, in Ontario 20 percent were electrified; in Scandinavian countries over 50 percent; in Germany and Japan 90 percent; in France between 90 and 95 percent; and in Holland practically 100 percent. In the main, public or cooperative ownership and Government loans and subsidies were responsible for these results, and although conditions widely vary in these countries, and they may differ from the United States in economic resources, density of population and form of government, the notable point is that the problem of farm electrification was considered of paramount importance to the economic and social welfare of these countries and solutions were obtained.

A review of the history of rural electrification in this country indicates that whatever progress occurred prior to 1935 was incidental to the extensions for other purposes such as service to towns and industrial plants, or to limited rural areas such as the irrigation districts of the west and the dairy and truck gardening areas as adjacent to urban centers. The private industry, although cognizant of the desirability of electric service for farms, was too closely governed by conservative policies of investment and lacked foresight and initiative in attacking a long range program of developing the agricultural market.

In view of the contentions of the private utilities that lack of farm income was one of the insurmountable barriers to the feasibility of rural extensions, it is interesting to note the results of a survey carried out by farm journal in 1938.[8] This survey even after two years of intensified activity in rural electrification estimated that 2,095,067 non-electrified farms representing 40.5 percent of the occupied farms not electrified were located in the 1,024 upper third of the counties of the United States; farms that account for two thirds of all cash farm income and averaged $1,733 cash income in 1937.

8/ Electricity on Farms --A study by Farm Journal, pp. 5-6.

V. THE FEDERAL GOVERNMENT ENTERS THE FIELD

The plight of the farm population and the necessity for farm electrification as a contribution to the national welfare was during the 1920's increasingly brought to public attention by farm organizations and public spirited citizens. In the October 1934 Report of the Mississippi Valley Committee it is stated that "Several reasons might be advanced to explain why only 10 percent of the nation's farms (less than 6 percent in the Mississippi Valley) purchase electricity. These are the lack of interest by operating companies in rural electrification, high cost of line construction because of the unnecessarily expensive type of line used, onerous restrictions covering rural line extensions, and high rates." 9/ It was likewise the opinion of the Mississippi Valley Committee that "unless the Federal Government assumes an active leadership assisted in particular instances by State and local agencies, only a negligible part of this task can be accomplished within a reasonable time." 10/

The National Resources Board in its report of December 1934 called attention to the value and application of reliable, low-cost power to industry, whereas agriculture had lagged because service was not available in most cases. This drew a conclusion from the Board that "it therefore seems necessary for the Government to stimulate the extension of this service in many areas." 11/

Under the Emergency Relief Appropriation Act of 1935, the Congress acknowledged the requests of farmers and indicated its belief in the social and economic benefits of electric service to agriculture by specific mention of rural electrification as a desirable public project. By an executive order of May 11 under the Act, the President established the Rural Electrification Administration to initiate and execute a program of rural electrification. REA was created as a purely lending agency not only to promote rural electrification but also as a works program to relieve unemployment. For the latter reason, it was visualized that existing private companies would function as the principal borrowers of funds. These companies had the facilities and experience to begin construction immediately and had, moreover, indicated their interest and desire to cooperate in active consummation of plans for rural lines which they, in many cases, had under consideration.

9/ Report of the Mississippi Valley Committee of the Public Works Administration, October 1, 1934, p. 51.
10/ Ibid.
11/ p. 353.

At the request of Morris L. Cooke, the first Administrator of REA, a number of leading utility executives met with him to discuss a tentative program. The problems to be faced were:

1. Financing of the construction of lines, wiring of farmsteads and purchase of appliances;

2. Construction of lines at a minimum cost consistent with good service;

3. Revision of rate schedules to stimulate use of electricity;

4. Education of farmers to the uses of electricity in special types of farming.

REA stood ready to loan the funds required for construction, and in cooperation with the Electric Home and Farm Authority to finance the purchase of equipment. The REA program was strongly supported by farm organizations and in the rural press and radio programs. Trade associations, manufacturers and labor organizations who would benefit by the program offered suggestions and opinions.

A committee of the private utility representatives was appointed to undertake a survey to determine the extent to which the utilities could cooperate in a program. In the summer of 1935, this committee returned to the Administrator a report proposing the construction of 78,180 miles of distribution lines to serve a total of 351,000 rural customers. The calculated cost of such a program was $115,685,000 for lines and an additional investment by the consumers in wiring and appliances of $124,564,000, making a total of $238,249,000. However, rates and extension policies proved stumbling blocks to full cooperation between the utilities and the Federal Government just as they had shown themselves previously to be obstructions in the way of widespread farm electrification. Whereas among the conditions prescribed for a loan were areal coverage, economical construction, and more equitable rates with simplification of schedules and elimination of contributions and high minimum bills -- all reasonable qualifications if rural electrification were to escape from the bonds which previously limited its progress -- the private utilities maintained the position that the problem was not rates but one of financing the installation of wiring and purchase of appliances. The Administrator disagreed with this restricted point of view and was therefore unable to comply with the request of the utilities for loans. Many companies launched rural construction programs with funds obtained in private money markets, and by the end of 1935 it became evident that private companies would not constitute an important class of borrowers from REA.

However, Rural Electrification Administration has continued to give every consideration to applications from private utilities, and a number of loans (less than 2 percent of total loans) have been made to companies scattered from New York to Florida and Texas.

VI. EMERGENCE OF THE ELECTRIC COOPERATIVE

This failure to secure the cooperation of the private companies left REA without borrowers, and for a period it was uncertain how rural electrification could be effected. Gradually, however, farm communities began to realize that if they were to have electricity they must organize borrowing corporations under their respective State laws. This they began to do and their organizations took the form of non-profit associations. These farmer-organized cooperatives have since become the principal borrowers of REA. With this development the need for a more permanent, long-range program was recognized by the Congress in the passage of the Rural Electrification Act of 1936.[12]

The Act provides that loans, which shall be self-liquidating within a period not to exceed 25 years, may be made to persons, corporations, States, Territories, people's utility districts, municipalities, and cooperative, non-profit, or limited-dividend associations for the purpose of financing the construction and operation of generating plants, transmission lines and distribution lines for the furnishing of electric energy to persons in rural areas who are not receiving central station service. It is specified that in making loans preference shall be given to States, Territories, municipalities, people's utility districts and cooperative, non-profit, or limited-dividend associations. In addition to loans to provide facilities for bringing electric power to farms, the Act provides that loans may be made to borrowers for financing the wiring of premises and the acquisition and installation of electrical and plumbing appliances and equipment. All loans bear interest, the rate for any year being the average rate of interest paid by the Federal Government on its obligations having a maturity of ten or more years issued in the preceding years.[13] From this brief description of the Act, it can be seen that the Federal Government through its long-term lending program is providing not only electric power to farms but also facilities for its use, and all under reasonable financing terms.

12/ Public -- No. 605 -- 74th Congress, approved May 20, 1936.
13/ The rates have been: fiscal 1937, 2.77 percent; 1938, 2.88 percent; 1939, 2.73 percent; 1940, 2.69 percent.

The Administrator is authorized by the Act "to make, or cause to be made, studies, investigations, and reports concerning the condition and progress of the electrification of rural areas in the several States and Territories; and to publish and disseminate information with respect thereto."

VII. REA ASSISTANCE TO BORROWERS

With the unanticipated shift in the character of the borrowers, as a lending agency, REA has had to assume some of the functions which large private bankers have been developing on behalf of borrowers during recent decades.

These cooperatives and non-profit corporations are new organizations established primarily to enable their members to take advantage of the terms under which the Federal Government finances construction of distribution systems. They lacked experience not only in the technical field but also in the management of a heretofore non-rural type of enterprise -- an electric distribution system.

In order to obtain economical and efficient line construction and operation and thus the maximum benefits for borrowers as well as to safeguard the Government loan, it is necessary for REA to place technical and expert advice at the disposal of these new projects. Loans are generally made for 100 percent of the cost of a distribution system, to be repaid over a period of 20 to 25 years. Wiring and plumbing loans are made on a 5 year basis. Inasmuch as a mortgage of a system provides the security for a loan and the value of a system is the net income it can earn, REA is naturally concerned with the maintenance of the properties of the borrower and with the success of its operating activities. REA does not directly operate or manage any borrowers' system; it encourages local management on a democratic and cooperative basis; but it gives technical and managerial guidance as an aid to successful operations.

When a petition is received for electric service, REA recommends procedures for establishing a suitable form of organization and for conducting membership surveys to substantiate an application for a loan. If a project is found feasible from engineering and economic viewpoints, REA contributes legal assistance in determining proper procedures and in preparation of documents. REA engineers contribute expert engineering advice

and conduct extensive studies of design, materials and construction of lines for the benefit of borrowers' project engineers. Rate experts assist borrowers in their efforts to obtain satisfactory sources of power and reasonable wholesale rates, and in formulating retail rate schedules.

After a project goes into operation, REA gives counsel in the employment of competent managerial personnel, and in the application of good management principles which will enable the borrowers' systems to be of maximum service to their members. Training courses are organized at which suggested operating procedures and technical practices are outlined and a free intercourse of ideas and comments is obtained. REA auditors aid borrowers in setting up books of records in accordance with the FPC uniform system of accounts, are available for advice on financial problems, and of course make periodic audits on behalf of REA as creditor. All members of the REA staff are at the service of borrowers for counsel in the many specific problems which require technical or administrative aid.

Utilization specialists, including agricultural engineers and home economists, aid borrowers' managers in carrying out load-building programs. Group plans for low cost installations of wiring and plumbing have been developed to make these conveniences and necessities of modern life available to a maximum number of farms. All the functions of REA personnel are designed to bring to the individual borrower the services of a consulting unit of experts which it could independently not afford. Such expert services likewise save REA as creditor the expense of correcting the mistakes which the individual borrower would otherwise make. These activities are intended to fulfil the objective of REA to make electricity available to as many farmers as possible, and at the same time they provide the best guarantee of economic operation of projects and thus the maximum security of the Federal loan.

VIII. RESULTS OF THE REA PROGRAM

Rural Electrification in the United States has been stimulated by Federal activity in financing construction and attacking technical problems. The index by which this stimulus is evidenced is the increase in the percentage of farms electrified. In the four and one-half years during which REA has been in existence the number of electrified farms has more than doubled. Of a total of more than 6,860,000 farms in the country, it is estimated that approximately 1,510,000[14] or about 22.1 percent were receiving central station service on June 30, 1939. A comparison of the rank, percentage and number of electrified farms by states as of December 31, 1934 and June 30, 1939 is given in Table II, Appendix A.

REA had made total allotments of $265,135,293 to 678 borrowers by mid-November, 1939. These funds will allow the ultimate construction of 250,000 miles of line, make service available to over 700,000 farms, and to rural churches, schools, and commercial enterprises. Based on the 263,000 rural consumers served by REA projects on June 30, 1939, and the trends of consumer connection, it is estimated that 400,000 rural consumers will be served by the end of 1939. Table III, Appendix A shows the apportionment of REA allotments, number of borrowers and the percentage of farms electrified for each state.

Aided by a general recovery from widespread business depression and new farm legislation which have increased income to enable many farmers to take advantage of electric service, the influence of the program inaugurated by the Federal Government to finance and promote rural electrification has been notable. It should be noted, however, that the effects of this program have not been limited to areas in which Federal funds were utilized; that REA is generally credited with stimulating a more rational, progressive and agressive attitude by the private utilities in the construction of rural lines.

IX. THE REACTION OF PRIVATE COMPANIES TO THE REA PROGRAM

The records of REA are replete with cases of private utilities that failed for years to accede to requests for electric service from rural areas only to spring to action to contest the formation of rural electrification cooperatives. The so-called spite line tactics of private utilities have generally followed the pattern of intercepting

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14/ Established by REA survey.

the construction of cooperative lines by building a line or two hastily into the densest sections of the proposed cooperative area. In situations where the power companies have signified their intentions of making service available on an area basis, cooperative groups have often with REA approval withdrawn their application for an REA loan in favor of the private companies. Such was the case in the State of New York where, after a group of Seneca County farmers had organized a project and submitted their application to REA, subsidaries of the Associated Gas and Electric Company announced that they were prepared to completely electrify Seneca County. In fact the representatives of these companies were quoted as saying "that if a project was to be undertaken to electrify the farms of Seneca County, they (the utilities) certain could not afford to let it be done by anyone else."15/

There have been numerous other cases, however, where utilities have constructed lines through the heart of a borrowers' proposed system, thereby following the old practice of "cream skimming." Such tactics have destroyed some REA projects and seriously hindered others, leaving many farmers pocketed where the expenditure to reach them in the future may be prohibitive. Some of the reprehensible devices employed by utilities to destroy projects, which at the same time demonstrate the utilities vitalized interest in rural electrification, are illustrated by affidavits filed in connection with suits initiated by the Alabama Power Company in 1936 and 1937 to restrain certain projects known as Alabama 21 Cherokee and Alabama 18 Cullman from construction. These affidavits are in general as follows:

1. That after refusing for several years to construct a particular power line, the Power Company after development of the cooperative movement surveyed and constructed lines across the affiants' premises without their permission and in many instances over their express protest.

2. That the Power Company lines constructed after the development of the cooperative movement were constructed without any load study.

3. That Power Company representatives signed certain property owners' names to Alabama Power Company applications without those persons' consent and used such signed applications in order to influence neighbors to sign applications for power.

15/ Fifth Annual Report of the Power Authority of the State of New York for the year ended December 31, 1935, Page 93.

4. That Power Company employees represented to members of the Cooperative that the Cooperative lines would never be built.

5. That Power Company employees represented that if the cooperative's members failed to pay their bills when due, the Government would own their homes.

6. That Power Company employees represented that Alabama Power Company would own the cooperative's lines within two years.

7. That Power Company employees represented that the cooprative was financially unstable and would be unable to pay judgments in law suits brought against it (further adding that "electrical lines were very dangerous and that there would be lots of people killed by these lines").

8. That Power Company employees, in order to induce persons to take service from their line, represented that the cooperative members could take service from the Power Company until the cooperative's lines were completed and then change over to the cooperative.

9. That following the cooperative's activity, Power Company representatives told cooperative members that the Power Company would serve them "without regard to the amount of load possible."

It should be emphasized at this point that the reactions to REA indicated by the above citations have tended to disappear and are characteristic today of relatively few private companies.

It is obvious that as a consequence of the establishment of REA the utilities at least increased the tempo of rural line construction; clearly, the incentive was provided by REA. Many independent confirmations have been afforded of the fact that the Federal rural electrification program has stimulated activity in many areas where utilities have realized that if they did not become alert to their obligations and opportunities the farmers would turn to REA. In Appendix B are presented excerpts from the reports and publications of state public service commissions and rural electrification committees which bear witness to the accelerated rural construction programs and liberalized rates of private utilities under the influence of REA.

For example, in its report for the years 1936 and 1937 the Public Service Commission of Kentucky remarks:

"Fully aware that immeasurable social and economic benefits have long been denied the majority of Kentucky's rural citizenry through inavailability of utility service, the Commission, at the outset, took an active interest in the plan for extensive rural electrification through cooperation with the Federal Rural Electrification Administration.

"Faced with competition, many private utility companies, formerly reluctant to run rural line extensions in any but the most profitable areas, have reduced minimum monthly bills, and waived former contribution requirements to encourage new rural business."

"The Wisconsin Rural Electrification Coordination in appraising the first year of the REA program in Wisconsin comments in October 1936 as follows:

"Startled out of a long sleep by farmers' REA cooperative activity, private electric utilities in the state jumped to their feet with sudden, new plans to extend rural lines to farmers whose requests had gone begging some twenty years. Strangely enough, these spurts occurred only in areas where REA cooperatives were developing. Private utilities began building "spite" lines within contemplated cooperative territory.....

"Rural Electrification activity in Wisconsin has brought the cost of line construction down to a reasonable figure. It has stimulated lower rates. It has liberalized new extension rules.....

"Unfortunately, however, the private companies have not always lived up to their promises. Once they secured territory away from cooperative organizations, they immediately tumbled into bed and went back to sleep; Wisconsin farmers are complaining of the slowness of construction by private companies."

The Wisconsin Rural Electrification Coordination office also reports a case in Outagamie County where the prospect of an REA project

induced the private company serving the area to reduce its rates and liberalize extension rules

> "to secure this rural business--business ignored completely before REA interest became active in the territory."

The Outagamie County agricultural agent in a letter of March 18, 1936, to the Coordination office states:

> '"There is no question in my mind or in the minds of the farmers that the REA is largely responsible for the unusual adjustment in rural rates over the entire State, and we appreciate that the service is worth as much to us as if we set up a cooperative organization."'

The Illinois State Rural Electrification Committee in December 1937 attributes the rural activity of utilities to the view that

> "REA has, among other things, injected an entirely new element into the field of rural electrification--the element of competition.
>
> "That utility companies have definitely recognized the existence of this new competition is easily seen in an examination of rural electrification activity in certain sections of Illinois.....
>
> "Meanwhile, however, the company has made no plans to inaugurate similar programs in.....divisions, which are not now threatened by cooperative competition."

In Arkansas, the Department of Public Utilities in its 1938 report calls attention to the fact that:

> "A real rural electrification program is under way," which, "did not happen of its own accord," but rather as a result of cooperation between the Rural Electrification Administration and the farm and state representatives.

The Public Service Commission of Alabama in its 1935 Annual Report makes the statement:

> "The entrance of this activity (Rural Electrification) on the part of the Federal and State authorities has stimulated the extension of rural electric lines by privately owned utilities into various parts of the State heretofore unserved."

The Kansas State Corporation Commission in its Fourteenth Biennial Report (July 1, 1936 to June 30, 1938) emphasizes two primary reasons for the intensified efforts of private utilities in that State to develop rural territory.

> "First, there has been a noticeable increase in interest in rural electrification among the farmers and rural inhabitants due to the educational program and activities of the Rural Electrification Administration. Second, the activity of the cooperatives moves the private companies to hasten the development of rural territory in order to secure most of the potential users of power who would ultimately be reached under their present policy of rural development."

It was observations of this type that led the Committee on Rural Electrification of the National Association of Railroad to suggest in its report of 1937:

> "That some of the state commissions could give impetus to the rural electrification movement if they went more than half way in cooperating with REA and if they embarked upon definite programs of securing liberalization of private utility line extension rules and if they made very greater efforts to bring about rate reductions and rate uniformity within their jurisdictions."16/

It is noteworthy that although REA has never made a loan in an area which an existing utility was actively prosecuting plans to serve, the commissions have discerned what statistics on rural electrification disclose; namely, that the mere availability of funds for self-service by farmers has constituted the effect of direct competition and stimulated immediate participation on the part of utilities to retain what was formerly considered a closed monopoly to be developed at will and as convenient. The application of REA funds is limited by the express terms of the Rural Electrification Act to areas without central station service. Sometimes contests between a farmers' electric service cooperative and a private utility to serve an area have had the semblance of competition initiated by REA, but it should be understood that such competition has resulted from the activity of private companies stimulated by the attempts of farmers to obtain REA loans for service

16/ Report of the Committee on Rural Electrification to the National Association of Railroad and Utility Commissioners 1937, p. 23.

which the power companies had previously rejected.

Occasionally a company, after speeding construction of strategic lines to block the development of an REA cooperative and to preempt an area, has refused to complete the lines which the cooperative would have undertaken. Practices of this type may deny electric service to many farmers for many years to come, and the Illinois Rural Electrification asks if it would not be

> "reasonable to expect that public utility companies should, in a spirit of fair play, apply the same policies to their entire territories as are applied in spots where the threat of competition has developed. An active interest by utility companies in rural electrification throughout the state before cooperative organization gets under way would certainly be the best way for them to meet this new competition. Utility companies might well lock the barn door before the horse is stolen."17/

Certainly, the public interest is better served by having utilities intensify their efforts to complete the electrification of areas in which they already have some lines, as in Kentucky where

> "Federal money that otherwise would have been required for cooperatives in these areas was thus conserved for sections of the State where existing facilities are less prevalent."18/

Commissions have assisted in minimizing controversy by requiring that electrification be carried out on an areal basis, as in Arkansas where

> "the company or cooperative assumes responsibility for complete electrification of the entire area. Since neither the power company nor the cooperative can build outside of their area, 'spite lines' cannot be built and neither can 'sniping' of customers occur."

Also in a progressive ruling the Arkansas Department of Public Utilities requires that the feasibility of an extension be determined on an area-wide basis so that a maximum number of farms will be served.

17/ Appendix B
18/ Appendix B

Likewise, public service commissions in Arkansas, Kentucky, Pennsylvania, Tennessee, and Wisconsin have required utilities to apply for certificates of convenience and necessity for the construction of spur lines in excess of one or two miles in length, in order to protect and to give full consideration to any project which might have similar plans.

In general there are indications that spite-line activity on the part of private companies is being abandoned as an instrument of opposition to Federal rural electrification. Recently a utility spokesman, in reviewing cases where "the demand for service by farmers may be so urgent that it is impossible for the utility company to take care of it in time to satisfy these farmers and in other cases;" where the utilities do "not wish to invest the necessary amount of money in farm lines to meet the urgent demands for service;" then "we can certainly have no quarrel with the formation of a cooperation and should in fact encourage it and help it get started."[19] This attitude is indeed a far cry from the widespread obstructive tactics of utilities in the earlier days of REA. Carried a stage further, it would be reasonable to expect private companies to concentrate their efforts in areas which they can electrify completely instead of racing to construct high density lines into new territory which will make the surrounding sections incapable of supporting lines to serve them alone. Utility acceptance of this view would uphold the contentions of REA that with 5,000,000 farms yet without service, its activities and those of the utilities are and should be complementary. It should become obvious to private companies that their sales of wholesale energy to cooperatives constitute desirable business--most of the cooperatives purchase energy of a neighboring private company. In many states, however, utility construction has been most intensive in areas where REA projects were developing or were already under construction. Typical cases have been Alabama, Illinois, and Michigan where perusal of maps of rural lines would show that REA projects are literally surrounded by utility lines which effectively block expansion of the cooperatives, and that areas where projects have not yet developed are relatively as unelectrified as they were in 1935.

From the character of the rural electrification programs of private utilities, therefore, it seems evident that, should the Federal Government curtail its program, the utilities would revert to their former apathetical attitude. There is no doubt that some rural lines would continue to be built, but rural electrification would no longer by the dynamic force of a growing social and economic program for the farmer.

19/ G. C. Neff - E.E.I. Bulletin, April, 1939, page 139

X. REDUCTIONS IN ENGINEERING COSTS

Prior to 1935 lines in rural territory were chiefly along main roads, where the amount of load was large enough to justify their cost in the eyes of the private companies. Construction and design of lines were conditioned by urban techniques and practices -- in fact, the lines were essentially extensions of urban lines -- utilizing conductors of small-size copper (no. 6 and no. 4) with weatherproof braid covering on cross-arms, and the spans were limited by their strength to a maximum of about 175 feet. These lines gave satisfactory service and were of reasonable design where customers were frequent and additional circuits, such as those for highway lighting, were often necessary. The cost, however, was excessive for locations where the customers were few and scattered, and where only a single primary circuit was required. Piecemeal construction which produced higher unit costs added to the picture of the excessive costs that discouraged rural electrification. In November, 1935, ELECTRICAL WEST in an "Engineering Symposium" stated:

> "Up to the present time investments in lines and services of between $1500 and $2000 have been practical because the customers per mile and the potential revenue were large enough to justify the fixed and operating charges of such lines. Such lines were economical with as low as five to seven customers per mile."

The Federal Power Commission, in undertaking its survey of Rural Electric Service on February 1, 1935 observes that

> "notwithstanding its importance, there exists in the industry a paucity of detailed data on rural electric line extension practices and costs."20/

In its survey the Commission found a wide range of costs to serve four customers per mile from $616 reported by the East Missouri Power Co. to $2,456 reported by the Cape and Vineyard Electric Company. It is interesting to note that whereas the Missouri Company included but $35 for right-of-way, engineering, transportation and general overhead, for Massachusetts Company estimated overhead alone at $117 and for all such items included a total of $306.

The principles which REA has followed are simple and few. Essentially they are simplification of construction, low rates, areal coverage and intensification of the application of electricity to agriculture. Discarding the practice of private utilities of constructing only those lines with a high consumer density, REA projects proceed on a community basis of electrification, making service available to all farms within an integrated area.

20/ Federal Power Commission, Electric Rate Survey, Rural Electric Service, Rate Series No. 8, February 1, 1935, p. 11.

1. Conditions in production cost:

[illegible]

[illegible]

[illegible]

Table IV in Appendix A has been prepared from data assembled by the Federal Power Commission and gives the costs of certain of the better known and more active private companies in rural electrification. The line costs of primary and secondary structures and conductors show a considerable variance, as do overhead, engineering and other costs. The 3kva transformer is the predominant installation and it will be noted that costs of meters, services and transformers for such installations are approximately the same for all companies. However, all of these total costs are in the neighborhood of $1500 per mile with presumably all overhead and other charges included. The explanation of this balance in total costs, although component costs differ, is apparently that the various companies estimate and weight their transportation, engineering and overhead differently, some including these items in material and labor costs, other choosing to estimate them separately. It will be noted that TVA construction, which is comparable in many respects to REA's, cost fully 20 to 50 per cent lower than for private companies.

Construction costs vary, of course, with the inclusion or exclusion of items such as right-of-way expense, overhead, services and transformers and with the terrain, density of consumers and loading zone. The "Engineering Symposium" mentioned above compiled the construction costs of companies in western territory and these, even with lengthened spans and simpler designs as an attempt to lower costs, vary from $1,000 up to $1,280 per mile including engineering, right-of-way and overhead expenses, but exclusive of transformers and services. With a minimum of $100 per customer connection and the usual minimum of five customers per mile, the overall costs would range from $1,500 to $1,800 per mile. There is also included here a striking illustration of what the so-called "substandard line", which now has become standard, means in the way of cost reductions.

One company gave the following story of its anticipated costs of construction and the results of pruning costs:

> "A 6-mile, single-phase, 11-kv. extension was estimated according to standard practice, to serve 33 rural consumers. The minimum height of poles to be 35 ft. with 40 and 45-ft. poles to support transformers and maintain the required clearances and the spans to average 250 ft. It was decided to use No. 4 bare copper for primary conductors. Approximately 5,000 ft. of secondary was figured, 75 per cent of which would be three No. 2 bare copper, the balance of smaller copper. The total cost, including an item of $900 for the survey and acquisition of rights-of-way, was $12,846 or $2,141 per mile, exclusive of transformers and services.
> "Early this month the estimate was revised to construct a substandard line with 18 ft. minimum primary clearance to ground and 15 ft. minimum secondary clearance. These clearances permit the use of 30-ft. poles, set five feet in the ground. The crossarms are to be one foot below the top

of the pole. If it is found necessary, in the future, to supply three-phase energy over this line, a king pin may be used to support the additional conductor. The spans were lengthened to average 300 ft. and two No. 4 A.C.S.R. was substituted for the No. 4 copper originally estimated. The conductor will be of ample size for the load to be served. The estimated cost of this line is $7,706 exclusive of transformers and services, a saving of $5,140 or 40 percent of the original estimate. The cost per mile is $1,280 including overhead and supervision. Comparative costs are shown below.

Item	Standard	Substandard	Saving
Poles and Fixtures	$ 7,822	$4,336	$3,486
Wires and insulators	3,752	2,940	812
Tree trimming	360	423	-63
Rights-of-way	900	...	900
Incidentals	12	7	5
	$12,846	$7,706	$5,140

"A better comparison would be a 5-mile extension with no secondary circuits or rights-of-way involved that was estimated first for standard construction, then re-estimated for substandard construction:

Item	Standard	Substandard	Saving	PerCent
Poles and Fixtures	$5,612	$2,762	$2,850	51
Wires and Insulators	2,628	1,656	972	37
Tree trimming	360	424	-64	-18
Incidentals	12	7	5	41
	$8,612	$4,849	$3,763	44

"Cost per mile of standard line, $1,722.40, as against $969.80. These estimated costs are for primary line only, costs of guys for secondaries, transformer grounds, etc., are omitted."

In the February 29, 1936 issue of ELECTRICAL WORLD, rural line construction practices of 105 different utilities in 37 states are compiled. In analyzing these figures the editor states:

"In the tabulated data there is exhibited a great confusion of costs abounding in instances of apparent contradiction where lines that look the same from the given technical information show great differences in costs."

This appraisal brings out in relief the fact that it was almost impossible to arrive at a typical rural line cost. Company practices ranged from estimating the costs of all materials going in to line construction down to the last nail each and every time an extension was built to establishing a fixed cost and applying it to every extension built. Overhead, engineering and right-of-way expenses are sometimes included in varying amounts and sometimes not at all. There is perhaps little to wonder at in this state of affairs since with the predominant practice of constructing a mile or two of line at a time, curves, tree-trimming, rocks, and other specific conditions may vary widely for sections of line adjacent to each other.

An EEI recapitulation of 1935 rural construction figures the country over reports a simple unweighted average investment per mile of line alone as $924 with $1,252 as an over-all cost including meters, transformers, and services for 5.4 customers per mile; and for 1936 estimates "the average cost for the power lines only is found to be $910 per mile and the total cost, including meters, transformers and services, about $1,250 per mile,"[21] for 4.7 customers per mile.

Although costs have been reported of lines being constructed for from $500 up to $2,000 or higher, the Federal Power Commission found in its study of May 1, 1935, that, "The larger number of utilities build rural lines ranging in cost between $1,000 and $1,500 per mile." This was at a time when considerable study had been given to the problem of better and more economical design of lines, and larger spans and simplified construction had had their effect in reducing costs. Yet many of the larger utilities as given in Table IV maintained their costs at the higher end of the cost scale at about $1,500, and the Power Authority of the State of New York report of the year ended December 31, 1935 states, "as late as the summer of 1935 utility executives of New York State were talking about $1,600 a mile and up for standard construction for the remaining job of rural electrification.[22]

Progressive engineers had questioned these high costs for years and many undertook to show the way to simplified construction and thus to lower costs. In the August 26, 1933 issue of ELECTRICAL WORLD, Mr. Eldredge (Chief Engineer, Memphis Power and Light Company) described the satisfactory experience of his company in employing high strength conductors and spans up to 600 feet to bring costs for primary line alone down to $477 per mile as compared to $808 per mile or

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21/ From: Edison Electric Institute Bulletin, October 1936 on "Rural Line Construction in 1936", page 419.

22/ Page 83.

a saving of 21.5 percent over older types of line. He classified this new type of line as "Grade A" construction well within the code requirements for strength and clearance.

Another example of cost reductions is that given by Philip Sporn, Vice President of the American Gas & Electric Company, in the July 1934 issue of Edison Electric Institute Bulletin as follows:

> "During the last three years we have devoted a great deal of attention to the problem of reducing the cost of rural lines. Our aim here has been not to use the cheapest possible material, but rather to find materials that gave the lowest overall cost, taking into account the rate of depreciation. To accomplish this we have simplified our rural lines to bare elementals.....The use of these types of construction has reduced the cost per mile of primary line to as low as $500. This is just about one-half the cost of the former types of construction."

The Detroit Edison Company, which has been one of the most advanced companies in developing and utilizing long spans and pole pins instead of cross arms to support conductors, estimated for the Federal Power Commission in May 1935 that its costs were about $800 per mile excluding services, meters and transformers, and $1,100 per mile overall cost for four customers to the mile.

These latter companies were showing the way and TVA and later REA construction carried through the simplification and streamlining of design to meet specifically the needs of rural service. The REA engineering staff makes studies, independently and in collaboration with manufacturers and field engineers, into the characteristics and applications of all materials used in rural line construction. It was recognized that large-scale rural electrification required large scale production methods, and that in turn the economics which would be effected by techniques of mass production would lower the financial barriers to electrification and widen the possibilities. The techniques which were employed included standardization of design and materials, standardization of construction methods, and adaptation of the assembly line principles to construction crews. Materials commonly employed for urban line shown by study to be unnecessary for the physical designs and load problems presented by rural service were eliminated and new designs and better materials were utilized. Horizontal cross arm construction was supplanted by the simpler and less expensive vertical

construction which carries conductors on pole pins which had been known to the industry for a number of years, but had never been in general use. Spans were lengthened by use of high strength conductors to an average of 400 to 500 feet as compared with 175 and 200 feet spans previously employed. The master specifications for REA financed lines embodied improved designs for less expensive lines which were "Grade A" construction in every respect and fully satisfied the National Electrical Safety Code requirements. Specifications are constantly reviewed in the light of experience and new engineering developments.

The engineering of lines was placed on a standardized basis. It is a maxim in engineering that any series of calculations which must be repeated often enough lend themselves to simplifications by resolution into charts, tables and slide rules, and REA has fully adopted this principle.

In the past it was common for engineers to profile terrain to determine the proper spacing of poles and conductor sags. A number of wire manufacturers established an engineering group, The Copper Wire Engineering Association, for the specific purpose of cooperating with REA in solving conductor problems. This group developed standard sag curves for use in staking lines, making it possible to eliminate the extensive and time-consuming calculations which previously marked rural line construction. Other wire manufacturers followed suit. With a fraction of the time and technical skill formerly required, a line can now be accurately surveyed and laid out by reference to the standard chart. Quick manipulations of specially developed slide rules for guying and voltage regulation solve problems which otherwise require long, tedious computations. Today the majority of current utility company rural construction employs the same or a similar type of design and practice that was coordinated rather than invented by REA and stimulated into general adoption.

The results which have been effected by an attack on the cost problems of rural electrification are exemplified in the following table of average costs of construction by REA borrowers:

Average Costs for Construction

Year	(1) Total Overall Cost per Mile	(2) Actual Construction Cost per Mile	(3) Estimated Construction Cost per Mile
1935-36	1,085	893	904
1937	934	800	858
1938	872	722	768
1939	(700)	(550)	583

Consumer density= 2.2 per mile

The above figures were arrived at by averaging costs of projects distributed in typical areas in the light and heavy loading zones under N.E.S.C. designation. Column (1) includes costs of primary and secondary distribution lines, substations, transformers, services, meters, inspection of poles and lines, engineering and legal services and all items of overhead attending the establishment of new enterprises such as costs of offices, warehouses, office equipment, trucks and an allowance for interest payments which accumulate until a project is energized. Column (2) gives the actual costs of construction alone and includes substations as well as lines, transformers and services. Column (3) shows the average estimated costs of construction on which allotments to projects are based. It must of course be recognized that the average of construction costs in the heavy loading areas was higher and in the light of medium loading zones was lower than the average costs indicated. There have been projects whose total costs have ranged from under $700 to over $1,200 per mile.

The figures in brackets for 1939 are indicated on the basis of the trends of costs in past years, the actual figures not being yet available because a sufficient number of projects have not been audited.

The sharp downward trend in costs can be attributed to a number of factors. In the first place, the change in design of systems is reflected inasmuch as the earlier projects were constructed with a view to expansion and contained a greater percentage of three-phase and two-phase lines as backbones for extensions than more recent additional construction on the same projects. Substations, construction and maintenance apparatus, office equipment and the like are all expenditures incidental to the establishment of a project, but are not as important a portion of expenditure in subsequent construction. Not a small responsibility for the decrease in average cost per mile should be credited to better organization and prosecution of work of project engineers and contractors under the guidance and assistance of REA engineers and inspectors. Competition between contractors as both an outcome and a cause of more efficient operation is one of the most important reasons for the decrease in costs.

The general trend of costs of rural lines of private utilities has likewise been sharply downward since the advent of the Federal program of rural electrification, although these do not approach on the average the low costs achieved by REA projects. In April 1938 Electric Light and Power published rural line design data of a number

of representative utilities, and a comparison of these costs with those reported to the Federal Power Commission in 1935 has been developed as follows, including in each case the average costs of transformers, meters and services for four consumers to the mile.

Company	Cost per Mile April 1938 by Electric Light and Power	Cost per Mile May 1, 1935 by Federal Power Commission
Empire District Electric Co.	$ 1,156	$ 1,266
Indianapolis Power & Light Co.	895	953
Ohio Public Service Co.	1,200	1,726
Puget Sound Power & Light Co.	860	1,225
Rochester Gas & Electric Corp.	1,110	1,617
Virginia Electric Power Co.	1,168	1,321

Although these costs may not be strictly comparable because of variance in voltage, transformer size and other factors, the point remains that the costs quoted on which rates must be based and return on investment earned are lower and thus extensions can be brought increasingly within the economic reach of the farm population.

The New York State Electric & Gas Corporation, which in 1935 reported $1,745 per mile as its cost for four consumers to the Federal Power Commission, is now constructing extensions with REA funds for an average of $1,200 per mile, and these are short extensions filling in territory on which the unit costs are naturally higher than they would be for construction of an integrated system. The Northern Indiana Power Company, according to the Federal Power Commission records, was building lines in 1935 at a cost of about $1,100 per mile for three customers, and its holding company, the Central Indiana Power Company, is now constructing lines under an REA loan for approximately $850 per mile of single-phase line to serve the same number of customers.

It seems evident that the range in costs reported by private utilities is narrowing, with companies previously reporting costs in the higher brackets now showing the greatest reductions in cost -- from 30 to 40 percent. The general average of costs which was from $1,500 to $2,000 per mile prior to 1935 has now decreased to from $900 to $1,200 per mile. The simplification of line design and uniformity and standardization of construction practices encouraged by REA have been influential.

XI-- EFFECT OF REA PROGRAM ON RATES AND EXTENSION POLICIES

As previously indicated, the major barriers to rural electrification were the conditions and rates imposed for service. Inasmuch as the usual REA borrower is a non-profit corporation, the rate schedule established by a cooperative calls for a revenue sufficient to meet only the costs of operation, maintenance, and investment. Included in these costs are the payment of principal and interest on the Federal loan, purchase of wholesale power and operation and maintenance expenses.

The new designs and techniques of rural line construction have reduced the costs of building rural lines and are thus reflected in the lower rates required to repay capital costs. Operating expenses can be minimized by high quality construction initially and by effecting good management and maintenance policies once a project is energized. Wholesale power costs which are an integral factor in the establishment of equitable retail rates and which may mean the difference between failure and payout of a project were initially at the determination of private utilities, hostile in most cases to the formation of cooperatives. Some companies refused to quote rates at all, whereas others offered wholesale rates averaging as high as 2.5 and 3 cents per kilowatt-hour. Actual rates in the early days of REA commonly averaged in excess of 1-3/4 and 2 cents per kilowatt-hour. Wholesale contracts were complex and contained many confusing clauses detrimental to the interests of the purchasers.

By constant negotiations with utilities and appeal to public service commissions, REA through its Rate Section has been able to reduce the average charge per kilowatt-hour, in which are included the earlier energy contracts, to 1.2 cents. In addition, older contracts are being revised voluntarily or with the assistance of State agencies. At the upper end of the scale now is North Dakota where private utilities offer rates to cooperatives averaging slightly in excess of 1.5 cents per kilowatt-hour.

The reductions in engineering costs and attainment of equitable wholesale rates have enabled average monthly minimum bills on REA projects of about $2.50 for cooperatives in the South and $3.50 to $4.00 in the North, under which the farm can usually obtain enough current to supply lighting needs and to operate a number of small appliances.

Generating plants have been authorized only in areas where no power sources existed or where reasonable rates could not be obtained. REA has made allotments of $6,829,000 for the construction of 36 generating plants. In Wisconsin, for instance, a group of cooperatives failed in negotiation to obtain satisfactory rates from the

Northern States Power Company, the Interstate Power Company or the Wisconsin Power and Light Company, and urged REA to allot funds for a cooperative power plant. With plans for the cooperative plant too far along to be abandoned, the Northern States Power Company offered a one year contract at 1 cent a kilowatt hour.

A similar group of cooperatives in Minnesota, unable to secure a fair rate, undertook plans for a generating plant which were dropped when the same offer from the Northern States Power Company was accepted. At the expiration of the energy contract, the power company raised its rate from 1 to 1.5 cents per kilowatt-hour. The generating plans of the Minnesota cooperatives were revived and construction is now under way.

An important effect of the reductions in wholesale rates gained by REA cooperatives from private utility companies has been the affording of similar reductions to other classes of wholesale customers of private utilities. At least three companies, Montana Power Company, Georgia Power Company, and Bangor-Hydro Electric Company, after revising their wholesale rate schedules for services to REA projects, have lowered their rates for other wholesale customers.

Much of the obstructive tactics of utilities through spite lines and high wholesale rates has evidently been launched in the fear that the retail rates advanced by cooperatives would constitute a "yardstick" and, in fact, the utilities have reduced their rates and liberalized their extension policies in order to intercept cooperative development. The revisions of rates and policies have produced plans and rates comparable to those suggested by the cooperatives too often to be coincidence or a natural free trend.

Typical of the results is the case of a number of farmers in Lincoln County, Idaho, who up to two years ago were required by the Idaho Power and Light Company to deposit $200 each and pay a $6.00 monthly minimum charge to obtain service. At the time of a preliminary meeting for organization of a cooperative, the charge was decreased to $96.50 plus a $5.00 minimum, and on the day of a mass meeting to form a cooperative the cash deposit was removed and only the $5.00 minimum was required. The Alabama Power Company carried this procedure a step further in rushing spite line construction to interfere with REA projects in Cherokee and Cullman Counties, Alabama, and according to affidavits abandoned minimum bills altogether and in some cases served consumers without any charges whatsoever.

The Adirondack Plan, requiring a revenue of approximately $24.00 per mile per month, was generally in effect in New York until 1930 when several small companies which have never made any significant

contributions to rural electrification announced new plans. The three major companies serving New York State, the Central Hudson Gas & Electric Company, the Niagara Hudson Company and the Associated Gas and Electric Company did not liberalize their plans until after REA rural electrification projects had been organized. In fact, the Associated Gas and Electric Company did not reduce its rates until negotiation with representatives of the Seneca County Rural Electrification Committee had convinced the private company that the project would go ahead with its plans unless suitable rates were granted. Table V, Appendix A, shows the minimum monthly bills of various New York utilities under the old Adirondack Plan as compared with the newer rates in effect in 1936. It will be noted that whereas under the Adirondack Plan for four customers to the mile the minimum monthly bill was $6.00 each, under the Niagara Hudson Plan the charge is $2.00 per customer or a reduction of 66 percent as compared with the Adirondack plan. The Central Hudson's plan under the same condition shows a saving of almost 50 percent. With the impulse of lower rates, the number of electrified farms in New York as of June 30, 1939 increased to about 80,000 or 40 percent more than the 57,825 farms served on December 31, 1934. However, the rate of construction has decreased; 3,800 miles of rural line were built in 1936, 3,200 in 1937 and only 1500 miles in 1938 to serve both farm and non-farm customers although there still remained about 90,000 or 55 percent of New York's farms without electricity on June 30, 1939. The early stimulus of the Federal program seems to have worn off, and it should be remembered that inasmuch as utility lines now crisscross almost every section of the State, there is little chance of formation of a feasible project for self-service. New York has fallen from fifth among the States in 1935 to fourteenth in 1939 in percentage of electrified farms.

The Iowa Nebraska Light & Power Company, serving rural customers in Iowa, Nebraska and Missouri, prior to May 1, 1936 limited its investment per customer to $400 with the consumer contributing the balance of cost, if any. Thus, for four customers to the mile an investment of $1,600 or the equivalent of this company's estimated average cost per mile was allowed and no contributions from the consumers were required. However, before January 1935, a service charge of $3.50 per customer per month was made in addition to energy charges, making a monthly bill of $8.88 per 100 kwh. In January 1935, the service charge basis was converted to a minimum monthly bill of $3.87½ including 6 kwh and the energy charges were reduced so that 100 kwh cost $8.05. The $400 investment limit was increased to $450 on May 1, 1936 with the provision that if there were two customers per mile no contributions would be required. In addition, the minimum monthly bill was increased to $4.50, but it included 50 kwh so that under the new energy charges 100 kwh cost but $6.50 or 73 percent of the rate in January 1935, with the last energy block cut from 4¢ before January 1935 to 2¢ after May 1936, thus providing an incentive for increased usage of electricity.

The State of Michigan has shown perhaps the most phenomenal increase in electrified farms in the past four or five years. From 42,152 or 21.4 percent of its farms electrified on December 1, 1934 the number tripled to 122,514 by June 30, 1939 or 62.5 percent electrified, bringing Michigan from eighteenth to fourth among the states in percentage of farms electrified. Of the increase of 80,000 electrified farms, REA construction alone was responsible for 12,000 or 15 percent. The Consumers Power Company has been one of the most active of private utilities in Michigan since the REA program got under way, and the trends in its policies exemplify the changed attitude of utilities in the State towards rural electrification. As previously stated, prior to October 1935 this Company had in use an extension plan whereby there was required a deposit of $1,000 per mile of line, less $100 for each farm customer connected at the time the line was built. This plan was continued after October 1935 in addition to another plan under the terms of which the company was required to make extensions at its own cost, without contributions from customers, where an average of at least five farm customers per mile would guarantee a minimum return of $12.50 per mile per month. Under the latter plan, which in effect allowed five customers to the mile to obtain service without the $500 contribution included in the alternative plans, the rural electrification activities of this company increased its number of rural customers in the one year of 1937 by almost 15,000 or more than half the 27,000 farms connected during the ten previous years.[23]

In January 1937 the extension plans were consolidated so that the Consumers Power Company would build a line extension wherever an average of five farm customers, or the equivalent thereof, per mile would guarantee a minimum of $12.50 per mile per month. The equivalent of a farm consumer is afforded by a deposit or contribution of $100 toward the cost of the line. Thus, wheras previously three customers to the mile were required to deposit $700 to obtain an extension, now only $200 is the contribution desired with an individual guarantee of $4.17 per month. The energy schedules are the same as applied to urban residential service and provide 100 kwh for $3.20. The same extension plan has been generally adopted by other Michigan private utilities.

The Consumers Power Company has apparently rendered an even more liberal interpretation of its extension rules in some areas. In various sections of Michigan which REA projects had surveyed and found to have a density of not more than three to the mile, the Consumers Power Company has intercepted cooperative action and constructed lines without requiring contributions or raising the minimum bill of $2.50 per month in accordance with its announced plans.

23/ "The Rural Electrification job of the Consumers Power Company", E.E.I. Bulletin, November 1938.

The Alabama Power Company, which has bitterly contested the formation of rural electrification cooperatives in Alabama, despite the fact that on June 30, 1939 only 27,500 or not one out of ten Alabama farms were receiving central station service, has radically altered its rate plans and requirements for service. Prior to January 1, 1937 a minimum connected load of 10 kilowatts per mile of line was required. Each customer was allowed a 1.5 kilowatts load for which the minimum was $2.00 per month. For four customers to the mile, 4 kilowatts additional to meet the minimum guarantee and equally divided among the applicantswould increase the individual guarantee to 2½ kilowatts. The minimum charge per customer was increased by 15 cents for each 100 watts above 1½ kilowatts and the total charge per month per customer was $3.50, which included 5 kilowatt-hours. For three customers to the mile, the minimum charge per month per customer was $4.75 for 5 kilowatt-hours.

On January 1, 1937 the minimum contract capacity was reduced to 7½ kilowatts but the clause was worded, "Before beginning construction of any suburban line, the company may require the customer or customers to be served therefrom to contract for a total minimum contract demand at the rate of 7½ kilowatts per mile of line," whereas it had previously been worded that there "should not be less than an amount sufficient to bring the total contracted capacity of all consumers served by a rural line to a minimum of 10 kw per mile of rural line." The company can therefore build an extension without regard to the number of customers, and in undertaking spite line construction to interfere with Alabama 23 Chambers, the Alabama Power Company did in fact build 19 miles of line from which but one customer took service. Where the minimum capacity requirement is enforced, the rate for four customers to the mile is now a minimum of $1.25 for 1½ kilowatts of demand plus 3/8 of a kilowatt at the rate of 15 cents per 100 watts making a total of $1.82 as the minimum charge per month per customer or almost a 50 percent reduction over the previous rate. For three customers to the mile, the rate is now $3.75 per month per customer or a saving of over 20 percent.

The Washington Water Power Company in 1936 had in operation a minimum rate of $2.75 per month per customer for 14 kwh where there were four customers per mile, and a minimum rate of $1.36 per month where there were 8 customers per mile. Despite these low rates there were apparently a number of areas where the farm density was less than four and farmers could not pay contributions to obtain an extension of service. Rural electrification cooperatives, which were backward in organization in Washington, have now gained momentum and are undertaking to bring service to many of the 40,000 or about 44 percent of Washington farms yet unelectrified. With the fruition of these

plans for self service the Washington Water Company placed in effect on August 28, 1939 a plan under which extensions will be made where the estimated annual revenue is $60 or more per mile. This requires a revenue of $5.00 per month per mile and extensions can now be built where there is an average consumer density of 2.5 per mile and where each consumer guarantees a monthly payment of $2.00 for which he received 36 kilowatt-hours.

It will be noted from the above cases that whether or not rates were high or relatively low for rural service, extension policies and rate schedules were revised to meet the new conditions and demands by farmers for service that were released by the ability of the farmers to provide themselves with electricity through REA.

XII.- PRIVATE COMPANY FINANCING

Although REA has been willing to consider applications or private utilities for loans with which to undertake rural electrification programs, only about $4,000,000 or less than 2 percent of the REA funds allotted by June 30, 1939 had been borrowed by private companies. It will be recalled that on the basis of the survey undertaken in the summer of 1935, the committee of private utility representatives proposed the construction of rural lines to cost $113,685,000. It has also been stated by spokesmen of the private industry that when loans could not be arranged with Rural Electrification Administration, the construction plans were eventually consummated with funds obtained elsewhere.

Evidently the common methods of financing construction were utilized; namely, through the issuance of corporation securities and application of operating funds or short term loans. A significant aspect of the attitude of the private industry towards financing rural construction is observed in the 1935 report of the Public Service Commission of the State of New York. It was the opinion of the Commission that "as long as the companies thought that there was some prospect of federal grants or loans upon nominal terms, they were inclined to await federal aid rather than provide their own funds." Furthermore, the New York State Commission suggested that the terms advanced by the Rural Electrification Administration "convinced the companies that they could provide their own funds almost as cheaply and that they could proceed with construction more rapidly if their operations were not subject to the close supervision, the constant inspection and the restrictions which were a part of the Federal program."24/ It is not out of place to note that the removal by

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private companies themselves of restrictions as to rates and extension policies have been carried in many cases beyond the point suggested by REA as a condition to loans to the companies.

Representative action taken by private utilities in financing rural construction is illustrated in the cases of several New York State Utilities in 1935. The Central Hudson Company undertook an issue of $1,000,000 of face value, 3½ percent, 30-year first mortgage bonds which netted the company over par for the first time since pre-war days. The Niagara Hudson Company announced its intention of financing extensions by means of operating funds or short term loans with permanent capitalization postponed. The New York State Electric and Gas Corporation likewise floated an issue of bonds.

On October 27, 1938 REA made an allotment of $359,000 to the Alabama Power Company to construct extensions to its rural distribution system. While negotiations for this loan were under way the obstructionist tactics which the Alabama Power Company had employed against rural electrification cooperatives ceased and in fact, there was little rural construction by the power company. However, the Alabama Power Company declined to meet the requirements of the Securities and Exchange Commission in filing data to support its application for a loan to REA and withdrew its request. Thereafter the power company renewed its raiding attacks on REA projects and was able to obtain the money required to carry on its construction.

Certainly, with the addition of about 400,000 farm customers and an undetermined number of other rural customers with a probable construction of at least 135,000 miles of line requiring a minimum expenditure of $135,000,000 from January 1, 1935 to June 30, 1939, financing of rural construction by private utilities has not been a major problem. The Rural Electrification Administration has been called upon, as stated previously for only about $4,000,000. A complete list of allotments to private companies is given in Table VI, Appendix A.

XIII. BENEFITS OF THE REA PROGRAM TO OTHER INDUSTRIES

In addition to helping to break down the high construction costs and high rate barriers to rural electrification, the Federal program of rural electrification has had other widely spread social and economic benefits.

To Private Companies

The private utilities themselves have shared greatly in these benefits. The improved and lower cost construction practices have aided materially in enabling utilities as well as cooperatives to increase their retail markets for electricity. Whereas approximately 744,000 farms or 10.9 percent of the farms in the country were estimated as receiving service in January 1935, the number had more than doubled in June 1939 to over 1,500,000 or 22 percent. Of the increase in electrified farms, at least 400,000 were newly added to the lines of private utility companies. Furthermore, of a total of 571 REA projects with power contracts on November 1, 1939, 369 are or will be supplied by private companies, 24 by the Tennessee Valley Authority, 55 by other cooperatives or generating plants, and 123 by municipal plants. The power sales of private utilities in the fiscal year ended July 1, 1939 to 275 cooperatives, including those energized during the year, amounted, according to preliminary estimates, to 75,000,000 kilowatt-hours with revenues of over $1,000,000. It is estimated that with the increasing loads and newly energized projects, power sales by private utilities will amount to over $2,000,000 in the year ending July 1, 1940.

The electrical characteristics of c operative loads are desirable to utilities which supply the energy. The power factor is uniformly high, in most cases close to unity, and load factors are likewise relatively high. The advantages derived by utilities from this type of load are increased efficiency and reduced generating costs. As an illustration which can be clearly defined, the municipal plant at Horton, Kansas, was generating at an over-all cost of 1.1¢ per kwh but when the Brown-Atchison Electric Cooperative Association was connected, this cost dropped to 0.82¢ per kwh.

The increased public attention focused on uses of electricity through press and radio should prove as beneficial to utilities and industry as to projects financed by the Government. The increased consumption of current by private utility customers in the TVA area is a case in point.

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To the Materials Industries

The rapid pace at which new rural users of electricity have come into existence has opened a new market for the manufacturers of line construction materials and electrical appliances. The first impulse reaches industry from the construction of lines. Lumbering, mining, smelting, electrical equipment hardware, plumbing and transportation, suppliers of raw materials and the finished product alike, share in the benefits to industry. From the start of the REA program on May 11, 1935 to June 30, 1939, it is estimated that Federal funds applied to line construction, wiring and plumbing required industrial products worth approximately $145,500,000. The construction materials entering the REA program are listed as follows:

Conductors	$48,500,000
Guys, Hardware, Insulators, etc.	33,500,000
Poles	27,000,000
Transformers	26,000,000
Generating equipment and plants	4,000,000
Meters	5,500,000
Wiring and Plumbing	2,000,000

In addition, it is estimated that wiring and plumbing installations by members of REA projects, financed by funds other than REA loans, utilized $26,800,000 worth of materials.

These figures do not take into consideration construction equipment purchased by contractors, electricians and others employed on REA projects.

The importance of this new market to industry is attested by the many letters received by REA from manufacturers of electrical equipment conveying the information that their plants are "kept going" by orders from R A projects and rural areas in general. The American Wood Preservers' Association in summarizing the output of the wood preserving industry for 1938 indicated that 3,545,077 poles were treated by the industry which accounted for 25.5 percent of the volume.[25] Under the REA program alone in 1938 about 1,150,000 poles were used in the construction of approximately 56,500 miles of line. Roughly one-third of the poles produced by the industry were utilized in REA construction, this constituting approximately 9 percent of the total volume of the wood preserving industry in 1938.

The magazine "Steel" in its Jan. 1939 issue published an article entitled "Surge of Rural Electrification Reflected in Metals and Equipment."[26] It called attention to the rate of 200,000 new rural

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25/ Wood Preserving News - July 1939 , p. 76-78
26/ P. 13, 14, 74

customers a year and considered it noteworthy that to meet the demands of this development would require 55,000 tons of steel and non-ferrous metals for conductors, transformers and accessory hardware, 40,000 tons of metal for wiring materials and equipment for new consumers, plus 15,000 tons for farms previously electrified. A total of 120,000 tons of steel, copper, aluminum and other metals are therefore consumed annually to meet rural electrification requirements.

According to a report of the Committee on the Relation of Electricity to Agriculture in 1931, "farms are not wired according to code or may not be wired adequately. There is much room for improvement here, and to the ultimate advantage of all concerned."27/ The C.R.E.A. report goes on to say, "Farm wiring is recommended .... as being one of the major problems of rural electrification."28/ Experience has shown that one of the most difficult problems facing REA projects has been to overcome the reluctance on the part of the farmer to wire his buildings adequately. A successful attack on this problem has been obtained by many REA cooperatives through group wiring of farms. Just as attention has been given to the standardization of materials and mass production methods of line construction, so have wiring plans and specifications been developed. Wiring inspectors licensed by state authorities insure the uniformly high quality of wiring jobs. Under the group plan, the customer is assured of the best materials at the lowest possible cost and the contractor is able to gain an adequate profit because of the large volume of business.

Although the C.R.E.A. also believed "adequate wiring according to present practice and code is too costly,"29/ the average wiring costs per outlet have decreased from $2.80 and $3.50 to $1.65 and $1.95 under the group plan of REA or a reduction of 25 to 40 percent per outlet. With the recognition of the need for more outlets for adequate service, however, the total average wiring cost has increased. Of course, the total wiring cost depends on the number of outlets but in the North an average wiring cost would be $175 to $200 and in the South an average wiring cost would range from $75 to $100. Of every $100 expended for wiring, it is estimated that 50 percent goes for materials, 35 percent for direct labor and 15 percent for overhead. A conservative estimate of the wiring costs of at least 660,000 farms electrified in the United States from December 30, 1934, to June 30, 1939 would be $60,000,000. Manufacturers

27/ C.R.E.A. Bulletin, Vol. VI, No. 1, June 1931, p. 11
28/ Ibid, p. 69
29/ Ibid, p. 11

of wiring equipment and electricians who would otherwise have been idle have thus enjoyed capacity operations. Before the establishment of REA, adequate wiring inspection in rural districts was available in only a few states. The farmer was exposed to the hazards of unsafe wiring. REA has attempted to correct this situation by a uniform, independent inspection service. Over 450 inspectors are now engaged in this work which should save the farmer thousands of dollars in eliminating fire losses resulting from defective wiring. There are indications that REA inspected farms will benefit from decreased fire insurance rates.

Already in one state, Kansas, electrified farms which have been inspected are allowed a 10 percent deduction in their fire insurance charges, although elsewhere it has been deemed that experiende with inspected farms has not been long enough to consider a revision of rates.

Modern plumbing facilities have been placed within the means of farmers by group plans for installation of plumbing. The group plan has not only enabled farmers to have high quality plumbing materials installed by experienced contractors at prices less than inferior materials would have cost previously, but also has made available these facilities at costs substantially lower than comparable plumbing systems can be had in urban areas. An illustration of the results of group bids for plumbing installations is afforded by the records of one project. Under the group bids, 171 members of the project were able to have completely installed an electric water-pressure system, with kitchen sink, water piping, drainage piping and disposal system with seepage drains, for as little as $120. For $180 additional, 118 of these farmers obtained a complete bathroom including tub, lavatory, water closet, complete disposal system with septic tank and all necessary piping completely installed. Thus for $300, under the group plan the farmer could obtain first class plumbing facilities which would have cost as high as $500 or even more for an individual installation of equal quality. That farmers are desirous of modern plumbing has been reflected in industry and the magazine "Steel" attributes the record high shipments of equipment for water systems to the rapid extension of rural electric service.[30]

Market for Appliances

Surveys of electrical equipment in use on REA projects have clearly indicated the large market which has been opened to manufacturers of household and farm appliances. The most comprehensive

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30/ Jan. 1939 - "Surge of Rural Electrification Reflected in Metals and Equipment", p. 74

survey was undertaken by REA in the summer of 1939 on 123 projects serving about 72,500 consumers. 50,295 or 69.8 percent of the members answered the questionnaire. The average length of time these farm people had been receiving service was 10.5 months. The survey results covering an extensive list of appliances are given in table VII. Some of the principal appliances and their saturation in use on the projects surveyed are as follows:

Iron	84 percent
Radio	82 percent
Range	3 percent
Refrigerator	32 percent
Vacuum Cleaner	21 percent
Washing Machine	59 percent
Water Pump	19 percent

Table VIII shows the comparison of appliance saturation figures for projects reporting in two surveys and it will be noted that the survey results of 1939 bear out the returns of earlier surveys. The comparison of surveys also indicates the rising trends of appliance saturation and a continuation of the demand for appliances. One of the most important facts established by the surveys is that the average farm family during the first year of electric service will expend about $200 for electric appliances. On this basis for at least 660,000 farms electrified in the four and one-half years prior to June 30, 1939, the expenditures for appliances probably have amounted to over $130,000,000.

Many of these appliances were considered as necessities and were purchased by farmers in the face of the lack or reluctance of dealers to conduct active sales campaigns.

An example of what price reductions and promotion of equipment that farmers are able to use to advantage can mean to farmers, as well as to the manufacturers and dealers, is furnished by an experimental activity undertaken in the spring of 1939 on 10 Iowa projects served from two REA financed generating plants. In the fall of 1938, REA suggested to a number of manufacturers that prices on ranges and refrigerators be reduced for a limited time. Eleven manufacturers agreed to 25 percent reductions in the prices of their two most popular models of ranges and many manufacturers offered similar reductions on refrigerators.

On March 1, 1939, the ten projects had a total membership of 5,524 and in a three months period of reduced prices from March 1 to May 31, 1939, the members had purchased 1,449 refrigerators, 190 ranges, 90 water heaters and 240 brooders. It is estimated that the total list price of these appliances exceeded $300 and that the savings to members were approximately $60,00 per assembly.

Perhaps the most important market for appliances and equipment on the farm is yet to be developed. Although agricultural engineers and others have been studying and creating new applications of electricity to agriculture for many years, manufacturers have had no incentive to bring forth equipment to meet the specific needs of farmers because of the relatively small market. Over 200 uses of electricity on the farm are now known, but where equipment of special design has been available the high unit cost has discouraged its use. With the greatly enlarged market for electrical farm equipment, many manufacturers are increasingly devoting attention to low-cost, general purpose equipment designed for use on the farm.

Development of New Equipment

The Rural Electrification Administration in addition to stimulating construction of rural lines has stimulated the development of new materials and devices to attain in operation of electric distribution systems the same low cost, high performance and advanced techniques of maintenance that have been obtained in construction of the lines. Transformers, lightning arresters, meters, fuses, circuit breakers, testing devices and servicing equipment designed for urban use are relatively expensive for the low revenue rural lines.

REA has no research facilities and must rely on pointing out to manufacturers the need and requirements of apparatus to meet the problems of rural electrification. Fortunately, most manufacturers have been quick to recognize rural electrification as an under developed market calling for new products which in no way compete with their standard manufactures and have cooperated in developing the ideas suggested by REA engineers.

There have been introduced on REA projects, a cyclometer-type meter which allows self-reading and self-billing by consumers to supplant the services of a skilled meter-reader required with the clock-type meter in general use. Likewise a cyclometer register has been developed that can be attached to the clock type to convert it to the cyclometer type. It is estimated that, on the average, self-billing reduces the cost of meter reading from 15 to 3 cents per member each month, and one Kentucky project has computed a reduction from 25 to 3 cents per member.

Ground meters for measuring the electrical resistance from the neutral wire to ground are important adjuncts to testing equipment since good grounds are required to assure a maximum of protection from lightning for transformers and other equipment. Only a year

ago, the most commonly employed ground meter was an imported make selling for about $350. After efforts to obtain a reasonably priced meter from the larger American manufacturers had failed, REA arranged with a relatively small factory to manufacture in volume an improved design of a meter which had been selling for $95 produced by hand, one at a time.

Several hundred of these meters have been purchased at $32 by REA projects and private utilities as well and considerable savings of equipment from lightning damage should result.

Two manufacturers following REA suggestions and specifications for a meter test kit are now producing an improved design of kit for determining the accuracy of electric meters in members' homes. This kit sells for less than $175 as compared to about $360 charged for old style kits.

For thousands of tenant and low income farmers living along REA lines who have been unable to afford even the minimum bills of $2.50 to $4.00 established by REA projects, there has been developed a new low cost service. This service consists of 600-volt-ampere transformer, a new gap for lightning protection, and a new type of circuit breaker so designed that the farmer can safely reclose it himself, all of which can be obtained for $23. The service entrance is made by means of underground cable and the farmer himself will dig a trench and back-fill it after the cable has been laid. Previously, the smallest transformer used was 1,500-volt-ampere capacity and sold for $38. Together with the service pole and equipment, an installation cost between $80 and $90. The new low cost service will allow the use of electric lights, radio and a limited number of small appliances at a charge of only about $1.00 a month.

Development of new equipment to meet the problems of construction and maintenance problems of rural lines is still of primary concern to REA engineers and it seems reasonable to expect that with the increased attention devoted to the subject, the accelerating pace of production of new and better equipment will continue.

XIV COMPLAINTS

During the existence of REA, there has been no case challenging the constitutionality of the Federal program of rural electrification in the courts. The usual outlets for private utility opposition have been first, the hasty construction of spite lines undertaken almost overnight without survey, sign-ups, or guarantee of consumers and second, the spreading of unfavorable opinions concerning REA cooperatives in campaigns of misrepresentation designed to make the proposed rates and extension policies of cooperatives suffer by comparison to those of private companies. The attempts of private utilities to hamper or destroy farmer-owned cooperative electric systems through spite line tactics and campaigns of misinformation have already been described in Chapter XX.31/ Most private companies of their own volition or through the regulation of state bodies have ara doned these devices of opposition to the Federal program of rural electrification.

There have been a number of cases where formal complaints have been lodged by private utility companies seeking, in local actions before the courts or state regulatory bodies, to restrict the rights of projects to do business in whole or in part. In the great majority of cases the cooperatives have been successful either in whole or in substantial part and as a result, there has been a decrease in adverse litigation by power companies in the past year.

The questions about which court actions have been taken have involved in general:

1. the validity of the cooperative charter, i.e. the right of the cooperative to proceed under the State Constitution and statutes.

2. appeals from orders of regulatory bodies, such as orders prohibiting spite lines and granting franchises to cooperatives.

3. interpretation of the clause in the Rural Electrification Act of 1936 which limits loans to the "furnishing of electric energy to persons in rural areas who are not receiving central station service." In this connection, it has been sought unsuccessfully to enjoin REA loans for distribution systems and generating plants as duplication of facilities in cases where spite line construction and unreasonable wholesale rate demands were practiced by the private utilities.

31/ page 14 forward - "The Reaction of Private Companies"

4. Miscellaneous issues, such as the necessity for cooperatives obtaining certificates of convenience and necessity or other authorizations from public authorities.

The Administrator has been named as a party defendant in only one case, where the Alabama Power Company unsuccessfully sought an injunction in the District of Columbia to restrain the duplication of lines alleged by REA to be "spite lines".

The majority of proceedings against REA borrowers have been before State regulatory bodies and have involved matters of public policy and administrative judgment rather than questions of law. Thus, some utilities have claimed exclusive franchises to develop areas which REA cooperatives proposed to serve. In other cases cooperatives have been required to justify their basic right and capability to operate successfully. In only two instances have REA projects been wholly defeated. One in Massachusetts was disapproved by the Department of Public Utilities on various grounds which, when summed up, indicate doubt as to ability of the project to operate successfully. In North Carolina, the Carolina Power and Light Company obtained a temporary injunction against the Johnston County Electric Membership Corporation on the grounds that a certificate of convenience and necessity was required from the Public Utilities Commission. Although the cooperative won the case before the State supreme court, the power company already had had the opportunity to destroy the project by spite-line activities.

Inductive interference of rural power lines with "ground return" telephone lines has been a source of complaint against REA borrowers and a number of suits for injunction and for damages have been instituted by telephone companies. Except where statutes have stated otherwise, courts have uniformly ruled that power companies are under no liability for damages resulting from interference with a telephone line if the claims are based solely on seniority in the use of a highway. As a matter of policy, REA project engineers endeavor to route lines without paralleling grounded telephone lines and REA experts on telephone interference render assistance in eliminating any difficulties which may arise. Rural Electrification Administration has permitted the limited application of project funds to aid in preventing interference by sharing the costs of metallicizing and relocation of telephone lines.

The sparing utilization of funds, appropriated by the Congress for rural electrification, for the betterment of telephone systems is necessary to avoid financial overburden of projects whose purpose is to provide electric service. In South Dakota, where a law in effect for several years places the burden for metallicizing

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[illegible]

telephone lines on electric companies, conditions are difficult and unfavorable for construction of rural electric lines. Public service commissions in Iowa, Nebraska and North Dakota have established as a condition of operation that REA borrowers may be required to share the cost of metallicizing telephone lines. However, REA projects in those States, in accordance with REA requirements, have usually been able to obtain waivers of liability from the telephone companies themselves. In Minnesota, a district court ruled that the Minnesota Railroad and Warehouse Commission had no jurisdiction in requiring an REA project to pay the costs of materials used in metallicizing. In Kansas and Oklahoma, commissions have themselves ruled that they lacked jurisdiction.

Court activity on the problem of inductive interference has been limited. Suits for injunctions or for damages instituted by telephone companies against REA borrowers have been filed in Indiana, Illinois and Ohio but were withdrawn later. The Arkansas Supreme Court has upheld a decision of the Arkansas Department of Public Utilities that light and power companies are not required to pay costs of metallicizing as a condition of the right to operate. A judgment of damages against an REA borrower in Texas, which had been based on a jury's finding of negligence in the construction of the power line rather than on general liability for inductive interference, was reversed by a Texas Court of Civil Appeals on the ground that the plaintiff had failed as a matter of law to establish the negligence.

Test cases to determine the liability of a power company for inductive interference are now pending before the Court of Appeals of Kentucky and the New Mexico Supreme Court. Complaints have been filed and are now awaiting trial in the lower courts of Arkansas, Georgia, Pennsylvania and Texas.

There have been a number of minor complaints against REA borrowers arising from the actions of engineers, contractors and project personnel in constructing and operating electric distribution systems. These have been the normal run of complaint common to any work of construction by private companies.

XV RESULTS OF REA BORROWERS' OPERATIONS

There are several factors to be considered in appraising the results of operations by REA borrowers to date. Thirty percent of the distribution systems for which loans have been made are not yet energized. Of the remaining 70 percent, 30 percent are constructing additions and are not completely energized -- i.e. of all REA borrowers only 20 percent are completed, well-rounded-out, energized going concerns. Operation conditions of the other 80 percent, in which new construction and operation of partial construction are mingled together, are not a stable basis for any appraisal. Furthermore, the average age of energized REA projects is approximately 10 months, and a public enterprise established to sell a service to consumers is subject to the same marketing conditions as a similar private enterprise and may face an initial period in the red. In recognition of this possibility, the Congress authorized the Administrator of REA to defer interest payments for as long a period as five years if in his judgment it is desirable.

Another consideration is the fact that judgments concerning the economic feasibility of REA borrowers' systems are not to be made on the basis of general utility experience. The cost of rural lines constructed in the past by private companies, and the reactions these companies have had to their severe rate and extension conditions, do not offer criteria for estimation of the feasibility and progress of systems constructed at the costs and under the service conditions of REA borrowers' systems.

Finally, it should be noted that technically, so long as an REA borrower pays interest, there cannot be a default prior to the end of the loan period -- 20 to 25 years. The principal is not due until the end of the period. Of course, as in many private businesses, REA has arranged for borrowers a scheme of monthly payments which by the end of the loan period will have met interest charges and amortized the loan. Parenthetically, the accepted practice of private companies is not to amortize. However, if at any time during the loan period an earthquake, cyclone, sleet storm, depression, injunction or other unfriendly act of nature generates expenses that make payment of several installments inconvenient, still there is legally no default. Likewise during the first years when consumption and income are being built up, if payments are inconvenient, there is no default.

The significant data which throw light on the prospects of eventual payout of REA projects are the data concerning trends. The vital factors are: The potential additional users in the system area, the new users being added month by month, the increase in revenue month by month, the more rapid increase of gross revenues

over the rate of increase of operating expenses, and the steady increase of net revenue.

Judged by criteria such as these, REA borrowers as a whole are in excellent condition and show assuring prospects. While it is too early to say that there will not in the end be some instances of insolvency, it is not unreasonable to anticipate as low a percentage of dollars unwisely lent as can any lender or investor doing business on a large scale in private enterprise.

Recently there was made a thorough sampling of the financial records of a number of REA borrowers. This analysis of forty-five projects energized during 1936 and 1937 and chosen at random from among about one hundred and thirty fully energized projects scattered throughout 45 states shows two striking results: First, these forty-five projects are earning a total net monthly revenue which is more than sufficient to meet the estimated total monthly interest and principal charges; and second, total net revenue is increasing at a more rapid rate than total operating expenses. For the month of August, 1939, these projects showed a total net revenue of $59,725 after all operating expenses were deducted with which to meet the estimated amount of $47,425 required for interest and principal payments. In other words these projects had a surplus of $12,300 or nearly 26 percent, after making full provision for all interest and amortization charges. While the total net monthly revenues increased from $33,080 in August, 1938 to $59,725 in August, 1939, an increase of 80.5 percent, the total operating expenses increased from $66,263 to $80,314, an increase of about 21.2 percent. A comparison of these percentages, 80.5 percent increase in net revenue and 21.2 percent in operating expenses, indicates the strides these projects are making in establishing themselves as successful operating enterprises.

The analysis of the forty-five projects also showed that the average monthly kilowatt hour consumption per member for five projects energized in 1936 advanced from 48 in August, 1938, to 52 in August, 1939 and for forty projects energized in 1937, the advance was from 56 to 62 KWH per member. It should be noted that the average kilowatt hour consumption per member increased despite the addition of over 10,000 consumers to the lines of these projects from 27,430 in 1938 to 38,481 in August, 1939. This would indicate that the increased use of electricity by older consumers was more than sufficient to overbalance the probable depressing effect on average consumption per member of lower usage by new consumers. The results achieved and the trends observed in a short

period of years are encouraging when it is considered that none of these projects has attained maturity of growth in number of members or in use and application of electricity to rural home, farm and industrial operations.

Of particular importance in appraising the financial results of the REA program to date are the figures showing the amounts due the Reconstruction Finance Corporation and the amounts which have been collected to meet these payments. As of June, 1939, a total of $225,397.74 was due the RFC for interest payments. Not only was this total amount paid in full but also REA had a surplus of $611,239.70 to its credit with RFC for future payments. This surplus indicates, of course, that collections of interest payments are ahead of schedule.

APPENDIX A

TABLE I: Number and Percentage of Farms Receiving Central Station Service, by States, 1923

	Number of Farms April 1920	Served Number of Farms Dec. 31, 1923	Percent of Farms Served
U. S.	6,448,343	177,561	2.8
New England	186,564	18,322	10.2
Maine	48,227	5,676	11.8
New Hamp.	20,523	2,396	11.7
Vermont	29,075	2,384	8.2
Massachusetts	32,001	2,445	7.6
Rhode Island	4,083	400	9.8
Connecticut	22,655	2,626	11.6
Middle Atlantic	428,147	29,918	7.0
New York	193,195	16,000	8.3
New Jersey	29,732	1,000	3.4
Pennsylvania	202,260	12,918	6.4
East North Central	1,054,744	32,857	3.0
Ohio	258,895	16,803	6.5
Indiana	208,128	3,228	1.5
Illinois	237,181	2,231	1.0
Michigan	196,447	2,996	1.5
Wisconsin	193,296	7,429	4.0
West North Central	1,096,251	18,778	1.8
Minnesota	178,478	3,339	1.8
Iowa	213,439	11,287	5.3
Missouri	252,004	2,913	1.1
N. Dak.	77,890	114	0.1
S. Dak.	74,637	485	0.6
Nebraska	124,417	790	0.6
Kansas	155,286	900	0.5
South Atlantic	1,158,976	6,910	0.6
Delaware	10,140	185	1.0
Md. & D. C.	48,112	1,000	2.1
Virginia	186,242	2,100	1.1
W. Virginia	87,292	215	0.2
N. Carolina	289,763	2,100	0.8
S. Carolina	192,693	900	0.5
Georgia	310,732	137	0.1
Florida	54,005	363	0.7

	Number of Farms April 1920	Served Number of Farms Dec. 31, 1923	Percent of Farms Served
East South Central	1,071,800	6,261	0.6
Kentucky	270,828	3,411	1.3
Tennessee	252,744	1,310	0.5
Alabama	255,097	1,000	0.4
Mississippi	293,131	500	0.2
West South Central	[illegible]	4,475	0.4
Arkansas	237,704	500	0.2
Louisiana	135,463	275	0.2
Oklahoma	191,[illegible]	1,600	0.8
Texas	434,[illegible]	2,100	0.5
Mountain	244,109	10,920	4.5
Montana	57,677	550	1.0
Idaho	42,106	5,050	12.0
Wyoming	11,742	230	1.8
Colorado	58,034	1,118	1.9
New Mexico	29,544	230	0.8
Arizona	9,375	225	2.3
Utah	25,542	3,350	13.0
Nevada	9,143	125	4.0
Pacific	234,164	50,714	21.7
Washington	64,298	13,470	20.9
Oregon	50,206	5,250	10.5
California	117,670	32,004	27.2

TABLE II: Comparison of Rank, Percentage and Number of Electrified Farms by States as of Dec. 31, 1934 and June 30, 1939

	Farms Reported By Census January 1, 1935		Farms Receiving Central Station Service[1] December 31, 1934			Farms Estimated From Rural Population Data January 1, 1939		Farms Receiving Central Station Service[2] June 30, 1939			Increase in Electrified Farms From 12-31-34 To 6-30-39		
	Number	Rank	Number	Pct.	Rank	Number	Rank	Number	Pct.	Rank	Number	Pct.	Rank
U.S. Total	6,812,350		743,954	10.9		6,360,608		1,513,228	22.1		769,274	103.4	
Ala.	273,455	7	11,053	4.0	33	286,481	6	27,500	9.6	38	16,447	142.8	15
Ariz.	18,824	43	5,577	29.6	12	19,749	43	9,000	45.6	12	3,423	61.4	30
Ark.	253,013	9	2,943	1.2	47	252,319	10	8,000	3.2	47	5,057	171.8	13
Calif.	150,360	24	81,093	53.9	1	169,416	22	127,000	75.0	3	45,907	56.6	32
Colo.	63,644	32	7,145	11.2	25	60,603	32	10,500	17.3	27	3,355	47.0	36
Conn.	32,157	39	10,138	31.5	10	33,469	39	15,000	44.8	13	4,862	48.0	35
Del.	10,381	46	1,791	17.3	20	11,117	46	3,430	30.9	22	1,639	91.5	24
Fla.	72,857	30	5,700	7.8	26	81,368	28	8,000	9.8	37	2,300	40.4	37
Ga.	250,544	10	6,956	2.8	41	254,475	9	34,965	13.7	33	28,009	402.7	3
Ida.	45,113	34	13,433	29.8	11	46,024	33	24,726	53.7	7	11,293	84.1	26
Ill.	231,312	11	28,379	12.3	23	233,864	11	60,000	25.7	23	31,621	111.4	21
Ind.	200,835	15	23,476	11.7	24	204,133	14	75,000	36.7	18	51,524	219.5	9

	Number	Rank	Number	Pct.	Rank	Number	Rank	Number	Pct.	Rank	Number	Pct.	Rank
Iowa	221,986	12	32,047	14.4	22	216,028	12	49,000	22.7	24	16,953	52.9	33
Kans.	174,589	21	13,224	7.6	23	162,249	24	17,200	10.6	35	3,976	30.1	40
Ky.	278,296	5	8,480	3.0	39	284,[illegible]	4	22,783	7.7	41	14,309	168.7	14
La.	170,216	22	2,826	1.7	46	172,[illegible]	21	12,474	7.2	42	4,648	341.4	5
Maine	41,307	36	13,949	33.3	8	44,248	35	19,274	43.6	15	5,315	30.1	39
Md.	44,501	35	6,731	15.3	21	44,661	34	14,900	33.4	21	8,169	119.4	19
Mass.	35,094	38	14,494	41.3	7	35,477	38	17,000	47.9	11	2,506	17.3	43
Mich.	196,517	18	42,152	21.4	17	196,[illegible]	19	122,514	62.5	4	80,362	190.8	11
Minn.	203,302	14	13,783	6.8	30	199,535	16	33,440	16.8	28	19,657	142.6	16
Miss.	311,885	2	2,802	0.9	48	318,936	3	11,641	3.6	45	8,839	315.5	7
Mo.	279,484	4	17,898	6.4	31	272,219	7	23,000	8.4	40	5,107	28.5	41
Mont.	50,864	33	2,768	5.5	32	41,174	37	6,000	14.6	32	3,232	116.8	20
Neb.	153,816	25	9,544	7.1	28	121,261	26	16,000	13.2	34	6,456	67.6	29
Nev.	3,696	48	946	25.6	15	4,054	48	1,414	34.7	19	470	49.7	34
N. H.	17,695	44	9,425	53.7	2	17,232	44	9,000	52.2	8	-495	-5.2	46
N. J.	29,375	41	15,162	51.6	4	30,724	40	24,000	78.1	2	8,838	58.3	31
N.Mex.	41,344	37	1,350	3.3	37	41,723	36	2,740	6.6	43	1,390	103.0	22

	Number	Rank	Number	Pct.	Rank	Number	Rank	Number	Pct.	Rank	Number	Pct.	Rank
Wis.	189,877	16	39,226	19.6	18	198,048	17	72,795	36.5	17	33,565	85.7	25
Wyo.	17,487	45	527	3.0	40	15,49[illegible]	45	2,252	14.5	31	1,726	327.3	6

1 Edison Electric Institute, Statistical Bulletin Number 4

2 Data From REA Survey as of June 30, 1939

3 Figures were calculated from data obtained by two different survey sources where differences in the definition of a farm and other procedures probably vary considerably.

TABLE III: REA Allotments, Number of Borrowers and Percentage of all Farms Electrified by States
(Data on Allotments and Number of Borrowers as of November 11, 1939)

	REA Allotments	Number of Borrowers	Percentage Farms Electrified June 30, 1939
United States	$ 235,135,238	678	22
Alabama	4,927,550	14	10
Arizona	7[illegible],000	3	46
Arkansas	5,590,500	13	3
California.	1,747,300	4	75
Colorado.	3,402,800	11	17
Connecticut	---	--	45
Delaware.	878,000	1	31
Florida	1,662,000	7	10
Georgia	18,814,615	36	14
Idaho	2,540,750	7	54
Illinois	14,947,130	27	24
Indiana	17,009,185	43	37
Iowa	17,787,828	50	23
Kansas	5,74[illegible],161	20	11
Kentucky	8,658,720	24	8
Louisiana	2,824,600	11	7
Maine	218,000	2	44
Maryland	705,000	2	33
Massachusetts	—	--	48
Michigan	11,252,500	14	62
Minnesota	18,117,236	39	17
Mississippi	6,975,700	21	4
Missouri	11,558,700	30	8
Montana	2,333,100	11	18
Nebraska	10,659,700	28	13
Nevada	227,000	1	35
New Hampshire	382,000	1	52
New Jersey	420,300	2	79
New Mexico	710,000	3	7
New York	1,375,000	1	45
North Carolina	6,213,350	22	19
North Dakota	1,988,972	7	2
Ohio	14,344,325	26	42
Oklahoma	6,523,000	18	6
Oregon	1,502,500	6	50
Pennsylvania	7,212,200	18	52
Rhode Island	---	--	84
South Carolina	3,648,328	8	14
South Dakota	1,732,800	7	4
Tennessee	8,406,058	15	10
Texas	20,286,685	59	9
Utah	579,000	3	54
Vermont	280,500	2	34
Virginia	6,351,800	14	21
Washington	3,824,200	12	57
West Virginia	582,000	2	18
Wyoming	1,715,800	10	14

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

TABLE IV: Construction Costs of Private Companies and TVA
(Cost Per Mile; Four Customers Per Mile)

Name of Utility	Voltage (kv)	Lines Primary and Secondary	Transformers, Meters and Services	Transformer size	Other Costs: Right-of-way and Survey	Other Costs: Engineering	Other Costs: Transportation	Other Costs: General Overhead	Total Estimated Costs
Alabama Power Company	2.3	$ 318	$322	3.6	$ 75	[illegible]	$80	$194	$1,544
Arkansas Power and Light Company		363	627		25	[illegible]	25	27	1,327
Central Illinois Public Service Company	6.9	863	543	3.0	[illegible]	10	[illegible]	166	1,761
Consumers Power Company (Michigan)	4.6	547	472	3.5	175	41	10	100	1,560
Detroit Edison Company	4.6	419	311	1.5			57	257	1,154
Georgia Power Company	6.9	645	543	5.5	72	36	45	143	1,[illegible]
Iowa-Nebraska Light and Power Company	6.6	665	770	3.0	50	40		60	1,[illegible]
Kentucky Utilities Company	2.3	601	249	3.0	50	[illegible]	60	100	1,460
Lexington Utilities Company (Kentucky)	7.3	379	356	1.5	50	40	60	[illegible]	1,416
New York State Electric and Gas Corporation	4.6	931	397	3.0	43	50	94	220	1,763
Northern Indiana Public Service Company	6.9	927	532	3.0		20	110	237	1,[illegible]
Otter Tail Power Company (Minnesota)	6.9	845	827	3.0	27	21	50	25	1,797
Texas Power and Light Company	6.9	526	501	6.0	125	56	35	119	1,[illegible]
Union Electric Light and Power Company (Missouri)	4.0	1,090	317	3.0		67	71	115	1,[illegible]
Washington Water Power Company	15.2	780	510	8				136	1,435
West Penn Power Company	2.3	709	447	7.5,5	155	25	33	69	1,464
TVA	6.9	435	286	3.0	43	40	40	64	900

Source: Federal Power Commission Electric Rate Survey, Rural Electric Service, February 1, 1935, Pages 91 - 96.

TABLE V: Minimum Monthly Bills Under Various New York State Extension Plans

Customers per mile	Feet of line per customer	Adirondack Plan 1/	Rochester	Oswegatchie	Central Hudson 2/	Casenovia	Niagara-Hudson MMC	Niagara-Hudson Contributions	Orange and Rockland 3/ MMC	Orange and Rockland 3/ Contribution
1	5,280	$23.76	$21.00	$13.00	$21.00	$14.15	$4.50	$325	$9.60	$1,200
1½	3,520	15.84	12.50	9.00	13.00	9.65	4.50	400	7.10	700
2	2,640	11.88	8.00	7.00	9.00	7.40	4.50	175	5.85	450
2½	2,112	9.50	5.30	5.75	6.50	6.15	4.50	50	5.10	300
3	1,760	7.92	4.20	5.00	5.00	5.43	3.50	0	4.60	200
3½	1,508	6.79	3.40	4.50	3.75	4.68	2.50	0	4.25	123.57
4	1,320	5.94	2.80	4.00	3.00	4.15	2.00	0	3.95	75
5	1,056	4.75	2.20	3.50	3.00	3.65	2.00	0	3.60	0
6	880	3.96	1.80	3.00	3.00	3.15	2.00	0	3.10	0
7	754	3.39	1.60	2.75	3.00	2.90	2.00	0	2.74	0
8	660	2.97	1.40	2.50	3.00	2.65	2.00	0	2.48	0
9	586	2.64	1.30	2.25	2.75	2.40	2.00	0	2.27	0
10	528	2.38	1.20	2.25	2.50	2.40	2.00	0	2.10	0
11	480	2.16	1.00	2.00	2.25	2.40	2.00	0	1.96	0
12	440	2.00	1.00	2.00	2.00	2.40	2.00	0	1.85	0

1/ Varied slightly due to varying treatment of fractional portions of a mile.
2/ Also applicable to Rockland Light and Power Company and Millerville Electric Company and Operating companies of Associated System.
3/ Assuming cost of $1,500 per mile, all residential service, and equal distribution demand.

Source: Report of the Public Service Commission, 1934, Vol. I, page 39.

TABLE VI: Allotments To Private Utilities
As of November 22, 1939

Project	Date	Amount	Miles	Members
Arizona 2 Stonewall Electric	5-18-39	$ 65,000	67	145
Arkansas 14 Arkansas Power and Light	9- 8-37	$325,000	503	1,652
"	5-16-39	$ 13,000	19.7	88
"	6-29-39	$200,000	250	1,000
Colorado 21 Stonewall Electric	3-22-39	$ 39,000	31	163
Florida 7 Florida Power Corporation	11-13-35	$154,500	185	438
Florida 12 Florida Public Service	11-11-36	$ 48,500	60	241
Georgia 15 Georgia Power and Light	11-13-35	$109,200	99	613
Illinois 4 Suburban Electric Corporation	9-24-35	$ 81,500	98	300
Indiana 101 Central Indiana Power Company	11- 9-38	$430,000	430	2,315
Iowa 6 Central Iowa Power Company	9-24-35	$ 5,616	2	50
Iowa 12 Amana Society Service Company	5-15-36	$ 37,000	24	246
Kansas 3 Utility Service Company	3-31-37	$ 35,000	35	100
Kentucky 1 Kentucky Rural Electrification Company	10-23-35	$ 71,700	56	231
Louisiana 14 Louisiana Ice and Electric Company, Inc.	3-22-39	$ 65,000	80	568
	10-23-39	-$ 15,000		
		$ 50,000		
Minnesota 5 Farm Electric Service Company	9-24-35	$100,000	100	300
"	3- 2-38	$ 10,000	Wiring	
Missouri 25 Missouri General Utilities Company	9-21-36	$117,000	127	515
"	10- 6-39	$ 48,500	52	219

Project	Date	Amount	Miles	Members
New York 18 New York State Electric and Gas Corporation	3-21-38	$250,000	245	1,031
"	10- 8-38	$500,000	416	1,636
"	1-31-39	$300,000	250	1,130
"	5-18-39	$325,000	501	2,265
North Carolina 9 Tidewater Power Company	9-24-35	$142,250	128	1,000
North Carolina 27 Roanoke Power and Light Company	5-12-37	$ 15,000	14	151
"	9-12-37	$ 6,000	To complete	
"	5-13-37	$ 25,000	Generating Plant	
North Carolina 23 Pamlico Ice and Light Company	12- 1-37	$ 61,000	85	344
	4-16-38	-$ 19,000		
		$ 42,000		
Oklahoma 8 Earl M. Baker Utilities Company	12-11-35	$ 30,000	30	155
"	6- 1-36	$ 43,000	51	160
"	9- 3-36	$ 13,000	18	50
"	9-13-38	$111,300	142.5	437
Texas 7 Bartlett Community Light and Power Company	9-24-35	$ 33,000	50	166
"	5-29-36	$ 5,000		
"	12-24-36	$ 9,500	9	36
"	10- 6-39	$ 60,000	88	239
Utah 7 Peoples Light and Power Company	2-18-38	$ 5,000	14	38
Virginia 13 Tidewater Electric Service Company	1-29-37	$125,000	130	509
"	1-31-39	$ 72,000	64	333
Virginia 20 Bull Run Power Company	6-23-36	$ 58,000	69	322
"	6-23-36	$ 29,000	Generating Plant	
Wyoming 17 Stonewall Electric Company	6-30-38	$ 24,000	19.5	138

TABLE VII: Percentage of Saturation of Electrical Appliances and Plumbing Facilities on REA Projects

Summer 1939

Appliance	Total 123 Projects	North East	North Central	South	West
No. Appliances	1.2	0.5	0.5	2.7	1.2
Household - Electric					
Coffee Maker	6.3	7.0	5.0	5.5	15.5
Hot Plate	19.2	16.0	23.4	11.6	32.9
Iron	84.2	89.8	86.9	77.0	83.1
Radio (non-battery)	82.4	88.3	82.1	80.7	79.7
Range	3.1	3.1	3.4	2.7	4.0
Refrigerator	32.3	24.0	29.1	42.4	32.4
Roaster	1.7	1.8	1.7	1.1	3.8
Toaster	31.0	41.0	37.6	13.7	35.4
Vacuum Cleaner (floor)	21.3	41.5	20.6	8.3	19.8
Washing Machine	53.9	67.4	78.2	23.6	55.1
Other	16.9	17.9	18.8	14.5	24.8
Plumbing Facilities					
Electric Water Pump	18.5	13.9	22.3	12.5	16.0
Electric Water Heater (tank)	1.2	1.4	1.1	1.1	1.8
Water Closet	6.4	5.6	6.8	5.9	7.5
Bathtub or Shower	9.0	8.0	9.5	8.4	11.1
Septic Tank	5.3	5.2	7.2	5.3	5.3
Farm - Electric					
Brooder	3.2	5.1	3.4	2.0	2.8
Cream Separator	14.0	4.0	28.0	1.6	4.6
Dairy Water Heater	0.3	0.2	0.5	0.1	0.1
Feed Grinder	0.5	0.3	0.7	0.2	0.5

Table VII Continued

	Total 123 Projects	North East	North Central	South	West
Farm - Electric (Continued)					
Electric Fence.....	2.7	3.1	4.1	0.6	2.0
Bathed Heating.....	0.1	0.0	0.2	0.1	0.1
Milk Cooler.....	0.7	2.0	0.7	0.0	0.2
Milking Machine.....	3.9	2.7	7.1	0.4	1.0
Motor, up to 1 HP.....	13.2	12.1	20.9	3.7	14.0
Motor, 1 HP. and over.....	2.3	1.6	3.6	0.9	2.1
Poultry Lighting.....	10.0	11.1	15.4	2.4	4.8
Poultry Water Warmer.....	0.5	0.6	0.8	0.0	0.2
Stock Tank Heater.....	0.1	0.1	0.1	0.0	0.1
Other.....	2.9	2.0	4.[illegible]	1.2	1.[illegible]
Consumers Reporting.....	80295	9541	22035	19015	3704
Percent Sample.....	68.5	64.7	71.3	68.0	65.9
Months Service Experience.....	13.5	12.0	11.0	8.8	9.8

TABLE VIII: Comparison of Appliance Saturation Ratios for Projects Reporting in Two Surveys

	Nine Projects, Seven In the North and Two In the South			Thirty-Four Projects, Twenty-Seven in the North and Seven in the South		
	Jan. 1938	July 1938	Actual Increase	July 1938	July 1939	Actual Increase
		Percent			Percent	
No Appliance	1.7	1.0	-0.7	2.3	1.0	- 1.3
Radio	85.6	89.3	3.7	78.5	87.7	9.2
Iron	81.1	88.1	7.0	82.0	88.1	6.1
Washing Machine	82.1	81.8	-0.3	82.4	84.2	1.8
Toaster	33.3	37.6	4.3	28.6	34.0	5.4
Refrigerator	21.9	39.3	17.4	29.0	36.6	7.6
Electric Water Pump	19.8	27.1	7.3	18.8	19.6	0.8
Vacuum Cleaner	18.6	27.4	8.8	18.5	23.0	4.5
Motor Up to 1 HP	16.0	19.7	3.7	13.3	21.8	8.5
Cream Separator	14.1	20.5	6.4	14.5	17.4	2.9
Poultry Lighting	13.9	18.5	4.6	8.3	12.9	4.4
Hot Plate	13.0	19.8	6.8	17.3	22.6	5.3
Coffee Maker	4.3	6.3	2.0	5.0	6.9	1.9
Milking Machine	3.2	3.6	0.4	6.5	6.2	- 0.3
Motor, 1 HP and over	2.9	1.6	-1.3	1.8	2.8	1.0
Range	2.1	3.8	1.7	2.8	4.1	1.3
Toaster	1.5	2.0	0.5	2.0	2.0	- -
Electric Water Heater	1.5	1.2	-0.3	1.8	1.2	- 0.6
Brooder	1.1	4.2	3.1	2.0	4.3	2.3
Dairy Water Heater				0.3	0.4	0.1
Milk Cooler				1.7	1.3	- 0.4
Consumers Reporting	2317	5450	3133	7240	12309	5069
Percent Sample	34.6	79.7	22.1	72.7	62.6	- 9.1
Months Service Experience	5.9	16.6	10.7	5.5	12.1	6.6

APPENDIX B

Excerpt from REPORT OF PUBLIC UTILITY COMMISSION OF KENTUCKY, Years 1936 and 1937:

"Rural Electrification Program (Page 21)

"Fully aware that immeasurable social and economic benefits have long been denied the majority of Kentucky's rural citizenry through inavailability of utility service, the Commission, at the outset, took an active interest in the plan for extensive rural electrification through cooperation with the Federal Rural Electrification Administration.

"During the latter part of 1935, the Commission instructed its technical staff to draft a rural electrification policy and a program of action for promoting and fostering extensions of electric service in rural areas in cooperation with the Rural Electrification Administration and the major utility companies.

"Rural Electrification Progress in Kentucky (Pages 23 and 24)

"Prior to January 1, 1937, very little progress had been made in rural electrification movement in Kentucky. Only two projects had been started with Federal funds; one of which was a private utility company project in three counties involving 56 miles of line to serve 231 customers; the other, a cooperative project covering 158 miles to serve 1,133 customers in Henderson County. Only about four percent of the 200,400 farm homes in Kentucky were enjoying central station electric service. There were probably no more than ten other states with fewer electrified farm homes than Kentucky. Rural electric rates were high and average consumption of electric energy was correspondingly low. During 1935 the consumption per farm home in Kentucky was 615 Kwh. Only one state in the Union ranked lower than Kentucky in average electric consumption per farm in 1935.

"With the passage of the Rural Electric Cooperative Corporation Act and the active participation of the Commission under its three-point program, the rural electrification movement progressed rapidly, and has gathered so much momentum, that available Federal funds have been wholly inadequate to meet the demand for electric service extensions in Kentucky.

"Cooperation of Private Utilities (Pages 27 and 28)

"Faced with competition, many private utility companies, formerly reluctant to run rural line extensions in any but the most profitable areas, have reduced minimum monthly bills, and waived former contribution requirements to encourage new rural business. A number of the larger operating utility companies, working with the Commission, have agreed to build rural lines in many areas with their own funds on reasonable guarantees of revenue. Where public interests could best be served by private utility lines, permission to build them was given by the Commission, and Federal money that otherwise would have been required for cooperatives in these areas was thus conserved for sections of the State where existing facilities are less prevalent. Notable examples of this were agreements between the utility companies, Farm organizations, and the Commission, whereby a utility company built 65 miles of line to serve 400 customers in Bradford County and another company built 110 miles in Jefferson County to serve 800 customers. The latter company is also building 40 miles in Oldham County to serve 180 customers.

"Rural Electrification Progress Summary (Page 30)

"In view of the serious shortage of Federal funds many cooperative projects will be forced to await allocations indefinitely. In the meantime it will become increasingly difficult for the Commission to protect territory for cooperatives pending such allocations. This situation may tend to slow up the cooperative movement in Kentucky, but on the other hand, it may serve to stimulate private utility interests to even greater activity in rural extension programs now that the initial step has been taken. There is still a great need for continuation of the extensive rural electrification program in Kentucky, and it is hoped that some provision will be made whereby Federal allocations to Kentucky for this purpose can be made commensurate with the growing demand for electric service."

Excerpt from THE FIRST YEAR OF THE R.E.A. PROGRAM IN WISCONSIN, Published by Rural Electrification Coordination, Madison, Wisconsin, October 3, 1936:

"PRIVATE UTILITIES STIRRED (Page 3)

"Startled out of a long sleep by farmers' REA cooperative activity, private electric utilities in the state jumped to their feet with sudden, new plans to extend rural lines to farmers whose requests had gone begging some twenty years. Strangely enough,

these spurs occurred only in areas where REA cooperatives were developing. Private utilities began building 'spite' lines within contemplated cooperative territory. Opposition to REA cooperatives became more and more pronounced. A series of hearings were held before the Public Service Commission in which 'gentlemen's agreements' were reached covering a number of projects. These agreements, however, proved to be deadlocks. Representing and fighting for the REA cooperatives in the hearings, Mr. Loomis stressed the necessity of a revised ruling by the Public Service Commission regarding rural electric line extensions so that Wisconsin farmers could benefit from the federal REA program.

"REA ACCOMPLISHMENTS (Page 4)

"In addition to bringing federal funds to Wisconsin for the construction of farmer-owned rural electric lines, state rural electrification activity has stimulated some startling moves among the private utilities.

"Rural electrification activity in Wisconsin has brought the cost of line construction down to a reasonable figure. It has stimulated lower rates. It has liberalized new extension rules. It has prompted new rural extensions of private companies. When the REA program first started, the private electric companies insisted that rural lines could not be built for less than $1500 per mile. A little later they claimed that lines could not be built for less than $1200 per mile. Construction bids recently received on the Highland and Columbus projects show that farm lines can be built in Wisconsin as low as $800 to $900 per mile. Through these lower construction costs, fixed charges for payments of principal and interest can be reduced, thus placing electricity nearer the reach of the average farmer.

"CHEAPER RATE REDUCTIONS (Page 5)

"One of the first REA projects organized in Wisconsin was in Jefferson county. It was followed by another in Walworth county. The private company operating in that area so ably became extremely active in its efforts to serve the territory. In order to secure this rural business, the private company was forced to eliminate its former charges of customer's contributions for building lines. It then reduced farmers' retail rates. In many cases these reductions were from rates as high as $12 per month for the first 30 months down to $4 per month. Later this same reduced rate became applicable throughout a large portion of the rural territory in the eastern part of the state. On June 30, 1936, another private utility operating in the northeastern part of the state filed with the Commission a new schedule of rates substantially reducing energy

rates and liberalizing its extension rules. On September 21, 1936, one of the largest utilities operating in the state-- and in whose territory a number of cooperative REA projects were started--reduced its rural rates $93,000 per year. Although these rate reductions enabled private utilities to break up and absorb cooperative projects in Jefferson, Walworth and Lincoln counties, it is estimated that cooperative efforts, with the assistance of Mr. Lewis and the REC, have saved Wisconsin farmers more than $1,000,000 in rate reductions and liberalization of extension requirements.

"BACK TO SLEEP (Page 6)

"Unfortunately, however, the private companies have not always lived up to their promises. Once they secured territory away from cooperative organizations, they immediately tumbled into bed and went back to sleep; Wisconsin farmers are complaining of the slowness of construction by private companies.

"OUTAGAMIE COUNTY (Pages 5 and 6)

"Outagamie county illustrates how the Rural Electrification Coordination office has aroused interest in rural electrification for Wisconsin farmers. Although Outagamie county farmers will receive their current from a private company instead of from an REA cooperative organization, their new lower electric rates have been made possible because farmers' interest in the self-liquidating REA program 'crowded' the private company to liberalize extension rules and to lower its rates in order to secure this rural business--business ignored completely before REA interest became active in the territory.

"'There is no question in my mind or in the minds of the farmers that the REA is largely responsible for the general adjustment in rural rates over the entire state, and we appreciate that the service is worth as much to us as if we set up a cooperative organization,' the county agricultural agent of Outagamie county voluntarily wrote to our office on March 18, 1938."

Excerpt from RURAL ELECTRIFICATION BULLETIN, Published by the State Rural Electrification Committee, Springfield, Illinois, Issue No. 13, December, 1937:

"LET'S SAY SAME THAT (Page 2)

"In analyzing the activities of the Federal Rural Electrification Administration during the past three years, it must be recognized that REA has, among other things, injected an entirely new element into the field of rural electrification - the element of competition.

"That utility companies have definitely recognized the existence of this new competition is easily seen in an examination of rural electrification activity in certain sections of Illinois.

"The Central Illinois Electric and Gas Company serves rural areas in three widely-separated parts of Illinois. In 1936 this company received certificates from the Illinois Commerce Commission to build 87 miles of rural lines in its three divisions. In the first seven months of this year, the company made application for permits covering 44 miles of line.

"Then, in the summer of 1937, an REA-financed cooperative in Menard county began to lay plans to extend its lines into CI & E's Lincoln division. In September, the company filed an application with the Commerce Commission, asking permission to construct 872 miles of rural lines, all in its Lincoln territory. This application was part of the company's plan to electrify 100% of its rural territory in the Lincoln area.

"This program must be highly commended. It is the first publicly-announced plan of an Illinois utility company to completely cover an entire area. Meanwhile, however, the company has made no plans to inaugurate similar programs in its Rockford and Albion divisions, which are not now threatened by cooperative competition.

"A rural electric cooperative needs a relatively large, undeveloped area in which to begin operations. So far, the Rockford and Albion areas have not seemed to qualify for cooperative development. With a complete lack of either cooperative or company activity in these sections, it appears likely that rural people in these two sections of the State will have to wait for electric service.

"A similar activity in competitive areas has been shown by the Illinois Iowa Power Company. This company has been one of the leaders in number of miles of rural line constructed during the past two years. But this construction has by no means been evenly spread over the company's extensive territory in central and southern Illinois. Sudden building activity in St. Clair and Sangamon counties, for instance, prevented the organization of proposed cooperatives in those counties. More recently, the company has been particularly active in its Champaign area, where organization of an REA cooperative was recently completed. Champaign county farmers, after waiting for years for company service, have decided that their area can only

be electrified through cooperative development. Further attempts by a public utility to interfere with this decision must certainly be deplored.

"It would certainly seem reasonable to expect that public utility companies should, in a spirit of fair play, apply the same policies to their entire territories as are applied in spots where the threat of competition has developed. An active interest by utility companies in rural electrification throughout the state before cooperative organization gets under way would certainly be the best way for them to meet this new competition. Utility companies might well lock the barn door before the horse is stolen."

Excerpt from FOURTEENTH BIENNIAL REPORT OF THE KANSAS STATE CORPORATION COMMISSION, July 1, 1936 to June 30, 1938, Pages 17-18:

"RURAL ELECTRIFICATION

"Several hundred miles of electric lines are now either built or are in the process of construction by cooperatives in the state, and as many additional miles are proposed in order to furnish several thousand farms over the state with electric service. In addition to their electric supply lines constructed, the activity of the cooperatives has served to intensify the effort on the part of the private power companies to develop the territory immediately adjacent to urban and rural territories now served by the companies. Two primary reasons stand out for this increased activity. First, there has been a noticeable increase in interest in rural electrification among the farmers and rural inhabitants due to the educational program and activities of the Rural Electrification Administration. Second, the activity of the cooperatives moves the private companies to hasten the development of rural territory in order to secure most of the potential users of power who would ultimately be reached under their present policy of rural development. The net result has been to practically double the number of applications for approval of plans and specifications of transmission lines, and the mileage of such proposed lines also doubled during 1937 as compared with 1936. It may reasonably be expected that this activity will increase in the future.

"A survey on July 1, 1938, indicates that approximately ten percent of Kansas farms now receive electricity from electric supply lines. Nearly eighteen and five-tenths percent of the 13,330 farms so electrified are served by municipal plants, while the remainder receive power from the central station plants of private utilities.

Kansas ranks twenty-third among the states in the development of rural electrification, and it also ranks twenty-third in the number of farms."

Excerpt from the STATE OF ARKANSAS FOURTH ANNUAL REPORT, DEPARTMENT OF PUBLIC UTILITIES, 1938, Pages 19 and 20.

"RURAL ELECTRIFICATION

"A real rural electrification program is under way in Arkansas. This program will require, approximately, an expenditure of $6,500,000 to construct 7,000 miles of rural electric lines to serve approximately 22,000 farm homes. More than five times as many farms will be electrified in all the years prior to 1937.

"This accomplishment did not happen of its own accord. It is the result of wholehearted cooperation between the farmers, farm organizations, the College of Agriculture, Governor Carl E. Bailey, the Department of Public Utilities and the Rural Electrification Administration.

"The eleven cooperative corporations will have invested, when the present program is completed, $5,790,680 to construct 5,768 miles of line which will serve immediately 17,589 rural customers. When the other farmers living along these lines have taken service, the number of farms served by this construction will be increased to approximately 25,000.

"The private utility companies, particularly the Arkansas Power and Light Company, have expanded their rural electrification programs during the past two years. The private companies have invested $696,409 to construct 1,002 miles of rural lines, to serve 3,726 farms. Over 90 percent of this construction was done by the Arkansas Power and Light Company.

"A summation of the rural electrification program in Arkansas during the past two years is almost unbelievable. A total investment of $6,487,089 to construct 6,770 miles to serve immediately 21,315 farms has been incurred, and yet this program, in reality, only constructs a backbone system from which in future years many thousands of additional miles of short extensions to nearby communities will be made.

Energy rates have gradually dropped, the status in the development of rural electrification, and it also works tremendously in the growth of farms."

Excerpts from the Board of Agriculture annual report, "Agriculture of Public Utilities", 1929, Pages 12 and 20.

"RURAL ELECTRIFICATION

"A real rural electrification program is under way in Arkansas. This program will require, approximately, an expenditure of $5,000,000 to construct 1,400 miles of rural electric lines to serve approximately 25,000 farm homes. More than five times as many farms will be electrified in all the years prior to 1927.

"This accomplishment did not happen of its own accord. It is the result of wholehearted cooperation between the farmers, farm organizations, the colleges of Agriculture, Governor Carl E. Bailey, the Commission of Public Utilities and the Rural Electrification Administration.

"The eleven cooperative corporations will have invested, when the present program is completed, $2,750,000 to construct 2,750 miles of line which will serve immediately 17,000 rural customers. This has cheaper farmers living along these lines have taken service, the number of farms served by this construction will be increased to approximately 25,000.

"The private utility companies, particularly the Arkansas Power and Light Company, have expanded their rural electrification program during the past two years. The private companies have invested $750,000 in construct 1,000 miles of rural lines, to serve 3,750 farms. Over 50 percent of this construction was done by the Arkansas Power and Light Company.

"A summary of the rural electrification program in Arkansas during the past two years is quite satisfactory. A total investment of $3,500,000 to construct 2,750 miles to serve approximately 21,250 farms has been made, and the work progresses. In reality, only constitute a start on a system that in future years may constitute of multiplied miles of rural extensions to nearly adequate size will be made.

"New Rules and Regulations Adopted: (Page 22)

"The Commissioners found that there were few rules and regulations regarding rural electrification. Thereupon they called a conference on rural electrification for March 2, 1937, which was attended by private company officials and others interested. The purpose of the conference was to obtain the best thought of all interested in the program to assist the Department in formulating its rules and regulations. Following this conference the Department adopted and issued a complete set of rules and regulations on April 22, 1937, for rural electrification. These rules provide that all certificates are granted on an area basis. This applies to both cooperatives and private companies. The company or cooperative assumes responsibility for complete electrification of the entire area. This prevents 'cream line' construction and insures electricity for all in the area when economically feasible.

"The area basis also gives the cooperative the opportunity to demonstrate the feasibility of this method of rural electrification. Since neither the power company nor the cooperative can build outside of their area, 'spite lines' cannot be built and neither can 'sniping' of customers occur. It prevents waste of funds and duplicate construction, makes for electrification of more farm homes and minimizes controversy.

"The rules also require accurate maps of the area and boundary descriptions. They provide for the construction of extensions when the estimated annual revenue is 18 percent of the gross cost of the line. The feasibility of the extension is determined on an area-side basis."

The Rules and Regulations Adopted: (Page 32)

"The Commissioners found that there were few formal and reasonable regarding rural electrification law. Therefore they called conference on rural electrification for March 2, 1937, which was attended by public company officials and other interested. The purpose of the conference was to obtain the best thought of all concerned in the program to assist the Department in formulating the rules and regulations. Following this conference the Department adopted and issued a complete set of rules and regulations on April 12, 1937, for rural electrification. These rules provide that all contracts are granted on an area basis. This applies to both cooperative and private companies. The company or cooperative assumes responsibility for complete electrification of the entire area. This prevents 'cream skimming' operations and insures availability for all in the area, more economically feasible.

"The area basis also gives the Commissioner the opportunity to demonstrate the feasibility of this method of rural electrification. Since neither the power company nor the cooperative can build towards at that area, 'spots alone' cannot be built and neither can 'skip-lag' or scattered areas. It prevents waste of funds and duplicate operations. Rules for electrification of more than lines and wind-mills conference.

"The rules also provide adequate maps of the area and boundary description. They provide for the construction of extensions when the estimated annual revenue is 10 percent of the gross cost of the line. The feasibility of the extension is determined on an area-wide basis."